AMERICAN GAS ASSOCIATION MONTHLY

Vol. VII No. 12

DECEMBER, 1925

Expanded Issue

THIS issue has been especially enlarged, for this month only, to include a report on "The Efficiency of the Oxygen-Carbon Dioxide Treatment of Carbon Monoxide Poisoning" by Dr. Cecil K. Drinker, Professor of Physiology, Harvard School of Public Health, Boston, Mass. The complete report will be found on Page 761.

Now You Can *Know!*

Industrial Gas Data Stripped for Immediate Action

UNDER the auspices of the American Gas Association, industrial gas engineers throughout the country have been busily engaged for months in collecting and preparing installation and operating data on the use of manufactured gas in a great variety of industries.

This material, in the form of printed data sheets, is now available for the first time to members of this Association. It is only the beginning, however. The first set of fifty sheets (comprising a limited edition of only a thousand issues) will be followed by other sets as additional information comes in. They are printed in handy loose-leaf form punched to fit a standard 8½ x 11 inch three-ring binder.

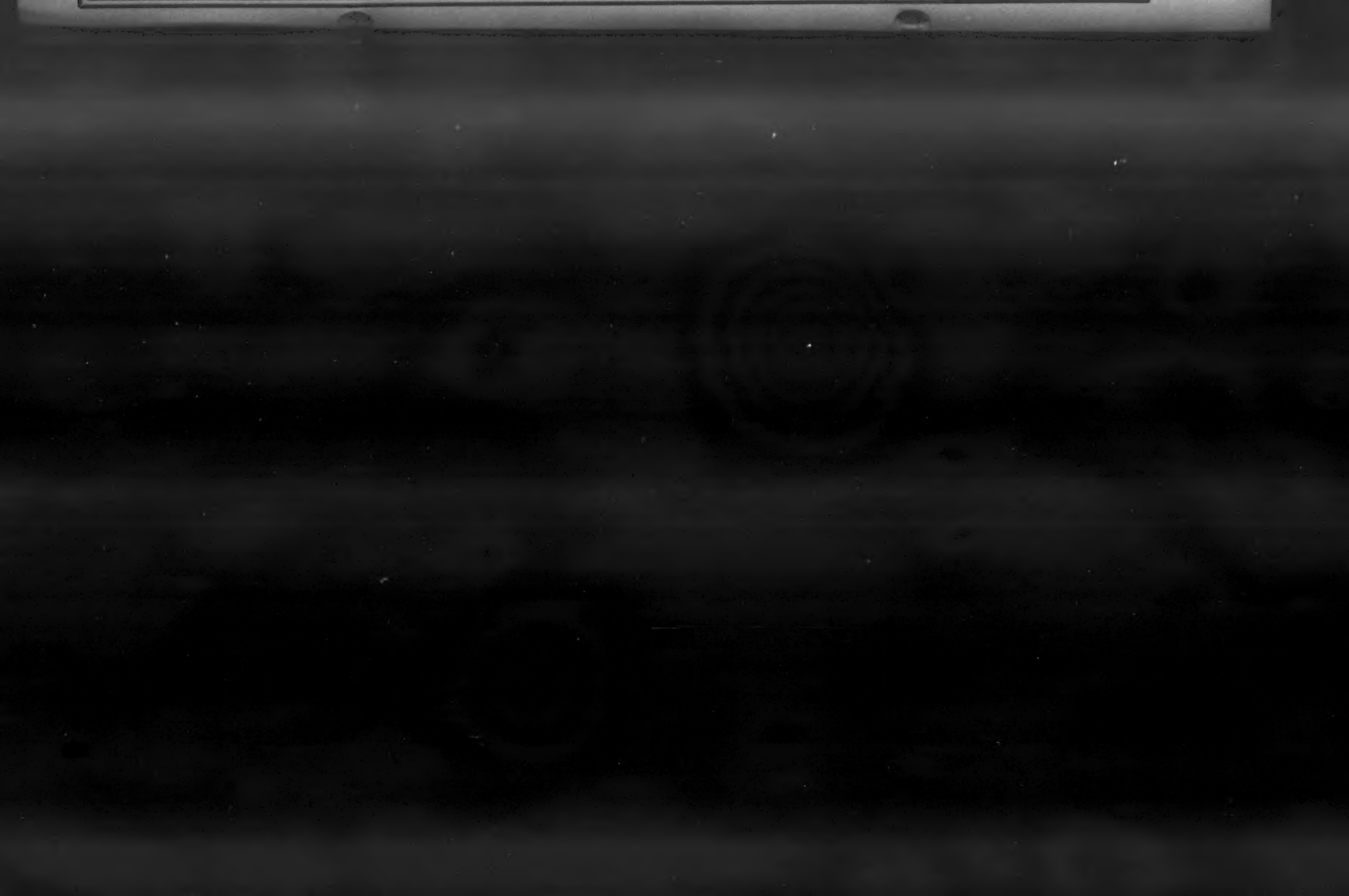
The price is seventy-five cents ($.75) per set of fifty sheets covering no less than ninety-two specific plants.

A. G. A. INDUSTRIAL DATA SHEETS tell at a glance what has been accomplished with gas, and they tell it in a form that can be *used*. Included in the first edition is information on glass moulding, enameling, japanning, drying films, core baking, mould drying, barrel drying, baking, galvanizing, brass and bronze melting, aluminum melting, white metal and solder melting, stereotype melting, varnish boiling, cotton singeing, water stills, bone char revivification, asphalt melting and others.

Only pertinent and specific data is given in the sheets, and they are entirely free from descriptive text. An index summarizing the fuel requirements of the various installations is a valuable feature of the work.

Remember—only 1,000 sets available. Price: seventy-five cents.

First come, first served!



AMERICAN GAS ASSOCIATION MONTHLY

342 MADISON AVENUE, NEW YORK, N. Y.

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VOLUME VII — DECEMBER, 1925 — NUMBER 12

CONTENTS

	Page
THE METALLURGIST BLAZING THE WAY FOR INDUSTRIAL GAS By Robert G. Guthrie	707
A STANDARD STORES SYSTEM FOR A GAS UTILITY By Walter Jay Sicard	713
SUPPORT YOUR TRADE PRESS By Alexander Forward	718
WHERE THERE'S A WILL THERE'S HOUSE HEATING By George L. Horning	719
A UNIQUE GAS HOLDER FROM SUNNY SPAIN By A. Gordon King	725
IS THE GAS MAN KEEPING ABREAST OF HIS TIME? By Earle W. Hodges	727
RECONSTRUCTION OF A 1,500,000 FOOT HOLDER By R. M. McCalley	729
GAUGING THE VALUE OF A HOME SERVICE DEPARTMENT By Mrs. Luella Fisher	733
THE LABORATORY ISSUES ITS CERTIFICATE OF APPROVAL By R. M. Conner	735
EDUCATIONAL ADVANTAGES OF BUDGETARY CONTROL By G. L. Stansbury	737
FUTURE FUEL FOR GAS MAKING ON THE PACIFIC COAST By W. S. Yard	741
EVOLUTIONARY DEVELOPMENT OF THE STATISTICIAN By H. C. Davidson	745
PAST, PRESENT AND FUTURE OF GAS ADVERTISING By J. Charles Jordan	747
SERVICING DOMESTIC APPLIANCES By George L. Myers	751
SHOWING THEM HOW IT'S DONE WITH GAS By R. J. Phelon	753
TWO GOOD WAYS OF GETTING AN AUDIENCE By R. R. L. MacLeod	755
THE USE OF OXYGEN IN GAS PRODUCERS By Alfred H. White and Howard G. Chamberlin	757
THE EFFICIENCY OF THE OXYGEN-CARBON DIOXIDE TREATMENT By Cecil K. Drinker	761

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For statements and opinions contained in papers and discussions appearing herein, the Association does not hold itself responsible.

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Our Own Who's Who

VII

HENRY L. DOHERTY

BORN, Columbus, O., 1870; Started as Office Boy in Local Gas Company, and Eight Years Later Became Manager of This and Other Companies; Organized Engineering Firm of Henry L. Doherty & Company in 1905, and Cities Service Company in 1910; Winner of Beal Medal Awarded by American Gas Light Association, 1898; On Organization Board of World's Congress of Electricity, 1904; President, Northwestern Electric Light Association, 1899, National Electric Light Association, 1901, and Ohio Gas Light Association, 1902; Vice-president, American Gas Institute, 1908; Member Executive Board, American Gas Association.

AMERICAN GAS ASSOCIATION MONTHLY

Vol. VII DECEMBER, 1925 No. 12

The Metallurgist Blazing the Way for Industrial Gas

Striking Achievements of Gas Company's Laboratory Have Revolutionized Entire Industries

By ROBERT G. GUTHRIE, The Peoples Gas Light & Coke Company

I CONSIDER the metallographic microscope and gas today as probably the two most dominant factors in American industry, and if they are not that today, they will be within the next two years or so.

While working on the situations described in this article, we have also had the time to break the world's record for high power photomicrographs three different times, and have held it for three consecutive years. The first effort, 11,000 diameters, was 5000 diameters higher than the best previous effort at that time. Last year, however, on Easter Sunday, we went to 12,500 diameters, and this year, only recently, we were successful in obtaining a plate which is far superior in every respect, regarding contrast and detail, at 15,500 diameters, which we feel is a record which will stand for many years to come.

All this, of course, serves only one purpose. The fact that we try to obtain the finest photomicrographs, as well as the highest powered ones that the world has known, has caused a great deal of comment both in this country and abroad. We are continually in receipt of letters from all over the country, universities, industrial concerns, steel mills, private individuals, asking our opinion on photomicrography.

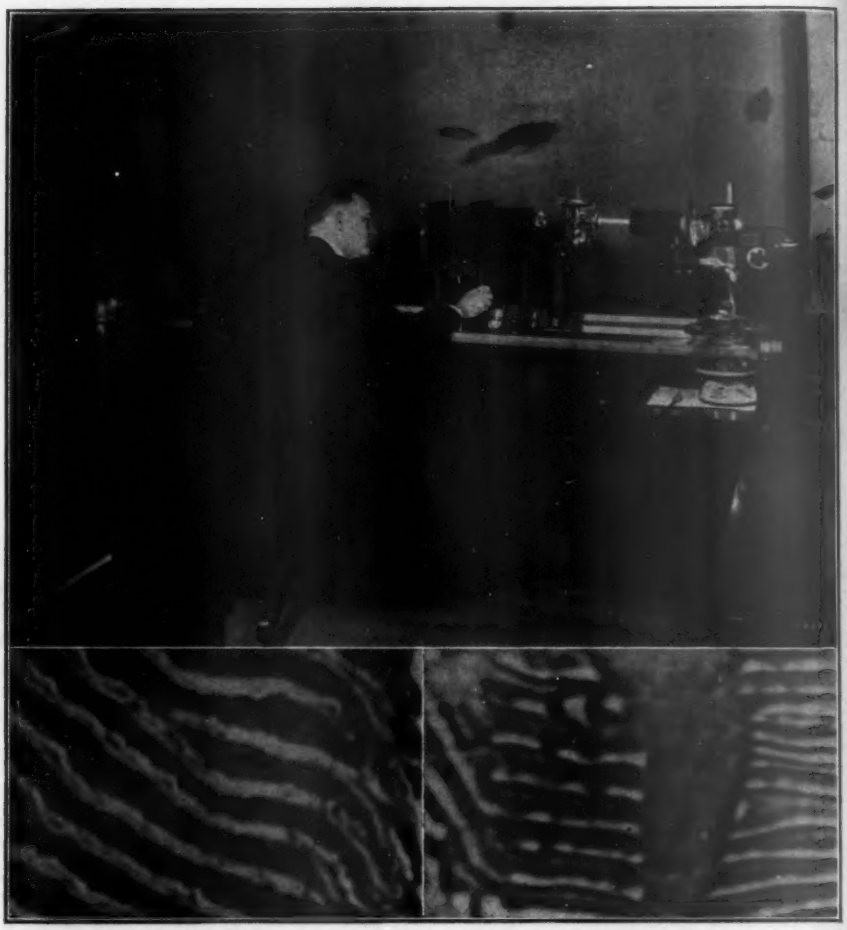
This results primarily in making our information that we arrive at regarding gas and the use of gas much more valuable, because of the people looking upon this laboratory as an authoritative source of information regarding questions metallurgical.

And, of course, it's a great deal like the circus man who carries his advertisements along with his product: we are doing the same thing by trying to excel at photomicrography in order that our reputation may be increased and better known in the field that we are really striving to improve, namely, that of industrial gas.

CASE OF THE JUSTRITE MANUFACTURING COMPANY ON MINE LAMP WHEELS MANUFACTURE

The problem presented itself as one of competition with foreign manufacturers who turned out a much superior product to the domestic one and did it for considerably less money. Three large concerns went bankrupt attempting to duplicate the European product.

We worked approximately 18 hours a day for three months and in the end installed a process which turned out a prod-



MR. GUTHRIE AT THE MICRO-METALLOGRAPH
Below, at Left, Lamellar Pearlite at 12,500 Diameters. Right, Hyper-Eutectoid Steel at 15,500 Diameters.

uct superior to the European product at a great deal less money, and the process as worked out was so accurate that five minutes plus or minus or the change in moisture content in the carbonizing compound would throw the process off. This was all arrived at by the use of the metallurgical microscope.

The situation to us did not mean so much as far as the actual dollars and cents on that particular job were concerned, but it opened up perhaps five or six more jobs and eventually led to thousands of dollars worth of increased business which we otherwise might never have touched.

CASE OF FORGING FINE HARDWARE MADE FROM BRASS

The problem here was due to the fact that the furnaces, though on gas, were not getting our production as desired, nor was the work done clean.

All the products of this company are made under drop hammers, and the finest brass hardware obtainable is made here.

Roughly speaking, we revised the entire process and shop from end to end, putting in automatic rotary annealing furnaces which fed punch presses and increased production some 200 per cent.

In these instances we supplied a new type of muffle that was never used before, and inasmuch as brass is low temperature work and has to be kept in a perfectly reducing flame, gas is the only fuel that could possibly be used on this job. In this connection the muffle was drilled full of holes, only the top and bottom being left solid. The top could not be perforated on account of the danger of dirt falling from the roof onto the parts as they were being heated. It resulted in a great saving and stabilizing of the quality of the finished hardware.

We had a company on our lines that switched from gas to oil when the gas rate was increased. This company makes the very finest machines for sewing cloth, leather, wire, etc., that can be obtained. They carry some fourteen thousand parts, every one of which is different. Of this number, twenty-two thousand parts are live, or in other words have to be manufactured constantly, and in this connection they were using five large oil-fired furnaces of the oven type.

After working intermittently for one and a half years with this concern, we evolved a process utilizing the American Gas Rotary Machine for carburizing work and retired their five oil-fired furnaces in favor of one 100-lb. carburizing machine.

It is interesting to note that, although the fuel for 100 lbs. of material only cost $1.80 with the oil-fired furnace, the finished product cost them $9.50 per 100 lbs. Using the gas-fired rotary in the new process, the fuel, although costing nearly twice as much as the oil, namely, about $2.70, the completed shaft of much higher quality only came to $4.50 per 100 lbs.

This is further proof of the fact that gas itself is only a service tool. It is the process employed and the service the customer gets that is of real value to him. These people absolutely would not be without this gas appliance,—in fact, they could not afford to. Their saving of over 100 per cent was calculated on the hardest job they do, whereas on other parts

Five Oil-Burning Furnaces Were Retired in Favor of This Single 100-Lb. Gas-Fired Carburizing Machine.

the saving amounts to as high as 500 per cent. It must be borne in mind that quality as well as costs was paramount and the product of the gas appliance was far superior to that of their former practice.

CASE OF THE MIEHLE PRINTING PRESS MANUFACTURING COMPANY

Another situation was that of the Miehle Printing Press Manufacturing Company, who were carburizing bed motion shafts five feet long by about four inches in diameter and had done so for some twenty-two years. On these shafts, weighing approximately 500 lbs. each, it was desired to put a case of about three-sixty-fourths of an inch.

For this job we designed a stationary pit-type carburizing machine built along the same general lines as the famous rotary gas carburizing apparatus, and they are now able to get a perfect shaft in six

hours, where formerly it took twenty-four.

This appliance, costing $5000, takes three of these huge shafts at one time. We have not received figures showing the exact saving, but it has been estimated by their own production engineers that it is something like nine times cheaper with gas than formerly using the cheapest grade of coal.

Another recent development of very popular interest is the work done on radio tubes in which the nickel plate and grid

This Gas-Fired Carburizing Furnace Does a Big Job Nine Times Cheaper Than with Coal Equipment and in a Quarter of the Time.

of the tube are degasified. When the nickel is cast and later rolled into sheets, and then into thin plates preparatory to stamping out the grids and plates for radio tubes, it absorbs a certain amount of gas and does not give it up readily. It is necessary to exhaust the bulb which houses these tube elements to .0001 mm. of mercury.

This has not been successfuly done in practice, since, when the tube has been exhausted and is supposedly all right, it will soften up, or, in other words, the gas in the nickel will be liberated slowly on use of the tube, making it unfit for use as an amplifying tube. This so-called "hardness" is probably the hardest part of the manufacture of a good amplifying radio tube.

We installed a vacuum type furnace, which we designed and built ourselves. In this furnace the elements are preglowed by heating under a partial vacuum to a very high temperature and let cool in the retort. They are immediately assembled into tubes and are able to attain the desired hardness.

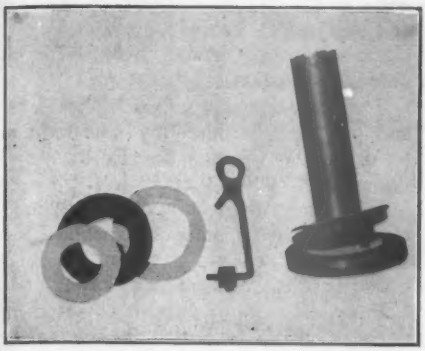
IMPROVEMENTS EFFECTED IN JEWELRY TRADE

Also, in the jewelry trade we have effected a few industrial improvements, one of which is the use of raw gas over the top of gold and silver crucibles to prevent contact of the crucible contents with the air. We have used raw gas jets on rolls turning out white gold and on the hammer dies with the result that it is possible to fabricate these precious metals without their coming in contact with the atmosphere at all.

Also, we have perfected the process of melting and rolling gold for penpoints. These points are tipped with iridium. This iridium is extremely hard and must not oxidize and is run with a gas torch right on the point of the gold pen. Once in a while some gases, presumably oxides, get entrapped in the gold, and, when this is the case, bubbling takes place, which fills the iridium tip with tiny blowholes. This is something that has to be watched very carefully, and when bubbling occurs, instructions are given the melter to run his heats higher and hold them longer before pouring the gold for the pens.

We have also made the doors air-tight by throwing away the doors on the furnace and using a ribbon burner at the bottom of the door which casts a large yellow flame up past the door thereby excluding the air. This is very convenient in forging, because of the fact that the operator can see through the flame and see just what is going on in the furnace.

There seems to be a sort of interference between this flame door in front of the furnace and the radiant energy emitted from the furnace at a much higher temperature than the door flame. Very little heat is lost through this door because of the luminosity of the yellow flame; that



Protecting Gasket Designed to Prevent Carburizing the Lead of Certain Shafts.

is, the door flame, containing no free mixed air, is much greater than the luminosity of the inside flame. It is very convenient, because the operator can reach right through this curtain with his tongs and insert or remove the parts as they are ready. This obviates the necessity of having to raise and lower a door and also is much more air-tight than any door could possibly be.

Something similar to this is done in the insertion of a pilot flame inside a high speed steel furnace. These furnaces have to run at very high temperatures, and, of course, the most economical way to get these temperatures is to use as nearly as possible the theoretical mixture of gas and air. Of course, sufficient air creeps in to oxidize the steel at the high temperatures at which the furnace is held, namely, around 2300 degrees F. So, instead of introducing the necessary raw gas to nullify the oxidizing effect of the excess air into the furnace through the heating burners, the operation is made separate and independent of the combustion mixture and the pilot flame is brought into play. This takes away the human equation, because of the fact that the operator no longer has to be experienced in running a reducing atmosphere, since, as long as these pilots are turned on, they take care of the atmospheric condition.

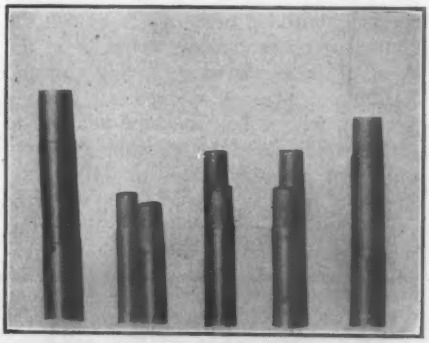
We do this on the heat-treatment of very fine carburized parts also. Of course, the raw gas creates an extremely strong reducing atmosphere within the furnace, and when the pieces are to be removed, if they are small enough to be carried out on a small shovel, the handle of the shovel is also connected with the raw gas line. This plays a low temperature yellow flame, strongly reducing, over the pieces on the shovel which are carried to the quenching bath entirely in the absence of air.

The shovel handle, of course, is connected by a long rubber hose to the gas supply and permits of this transfer. Thus the heat-treater may heat-treat and quench his work without it ever coming in contact with the air, with the result that he gets an extremely bright, clean product.

EXPERIMENTS TO AID NUT AND BOLT INDUSTRY

Here is a little information regarding the development which we have now worked on for about three years, and which is just now being taken over by the largest furnace manufacturer in this country. Although this situation has not culminated in a finished machine as yet, it is rapidly approaching it.

The bolt and nut situation was considered by us some three years ago, and at that time I designed a furnace which was so fast that the machine could not keep up with it. It was the practice at this particular plant, about which I am



Five Hundred-Pound Steel Shafts Carburized in Stationary Gas Furnace at Works of the Miehle Printing Press Company.

writing, to expect about 1000 to 1500 bolts per hour per man per machine. The furnace that we designed, although it was a little bit of a thing, requiring only part time attention from one man, hung up a record on its first trial of 3100 bolts in 27 minutes. This would beat the rate of about 6500 bolts per hour, or something like four times as fast as the fastest man they had could possibly make them.

The difficulties involved in using this apparatus, however, were accounted for by the fact that the feed mechanisms were not sufficiently rugged to stand up under this tremendous production. Although the company, which happens to be the International Harvester Company, was very much taken with the idea of the machine, they admitted that they would have to have new bolt machines before they could use this type of furnace.

It was only an experimental job, but it seemed to point the way for the entire bolt and nut business in this district. It was so well thought of that this large furnace manufacturer is now going to build us one—on a much more improved scale, of course—and also we will revamp and rebuild the bolt machines and feed mechanisms to stand this tremendous production.

In that connection, one of this new type machine would do the same work that every four machines formerly did. Inasmuch as these bolt machines, complete with furnaces, etc., would cost in the neighborhood of $6000 to $7000, the capital investment alone would be at the rate of one furnace saving around $24,000 of present appliances. Such a furnace, with a bolt machine adapted to it that would stand the punishment, would only cost probably $3000 or $4000, and the bolt machine about $4000, with the result that, for every $8000 spent on this new method, they would get the equivalent of $24,000 of the old appliances; and, of course, being some 300 to 400 per cent faster, it would obviously be indefinitely cheaper.

This situation is one which should result in increased monthly consumption to us in the Chicago district of something like 75,000,000 cubic feet.

Of course, we have many more situations, some even more spectacular than the ones I have enumerated, but it is rather hard to call them all to mind at one time and also more difficult to set them down in such a form that they would be useful. I have given some of the various operations which have come to pass in the last two or three years, and in each instance it is interesting to note that the new situation has invariably been arrived at by a study of the former methods in conjunction with a study of the material itself under the metallographic microscope.

THE STORY OF A LUMP OF COAL

ROTARIANS AT OUR CONVENTION in Atlantic City attended in large numbers the dinner of the Rotary Club at the Ritz Carlton on the evening of October 13th. The address of the occasion was delivered by Geo. W. Allen, secretary-treasurer of the Canadian Gas Association, Toronto, Canada. His story, assisted by lantern slides, was in reality the history, manufacture and development of gas.

L. N. Yetter, commercial manager of the Atlantic City Gas Company, comments as follows upon Mr. Allen's address:

"The address was very well received by the members of the Rotary Club, as well as the visitors, composed largely of gas men. There were about one hundred Rotarians and about seventy-five visitors, making a total of one hundred and seventy-five.

"In my judgment, it would be to the best interests of every gas company to have Mr. Allen give this lecture before some of their civic clubs or in the high schools, as I know of no better way to bring the development of gas before the public. This message will convey a thought to them that will grow and bring about a better understanding between the company and the customer."

In Memoriam

John D. McIlhenny, Helme & McIlhenny Company, Philadelphia, Pa.
Walter G. Africa, Manchester Gas Company, Manchester, N. H.
William H. McBride, Louisville, Ky.
M. W. Longfellow, Standard Gas Equipment Corporation, Baltimore, Md.

A Standard Stores System for a Gas Utility

Constant Checking a Secret of Success in Keeping Stock

By WALTER JAY SICARD, American Gas and Electric Co., New York, N. Y.

THE fact that any one phase of storekeeping duties can be dealt with in a detailed and extensive manner consigns the present article to a form of general outline with special attention to the more salient points of a stores system applicable to the gas utility.

The organization required to handle the storeroom operation is, of course, dependent on quantity or amount of material handled and local conditions governing same as well as the equipment available for handling. It has been the custom in the past for the storekeeper and his assistants to be chosen without especial regard for the future of the job and with the idea of physical rather than mental equipment. For this reason alone many stores departments that might have operated with success have failed, and public utilities of today are assigning the man with a goodly share of executive ability and tact.

Storekeepers are required to have even more detailed information regarding the entire operation of the utility business than the purchasing agent. The storekeeper is in contact with the inner workings from beginning to the end, while the purchasing department acts merely as a medium to serve the storekeeper and the other departments with supplies and equipment according to specifications submitted.

On all material in general use there should be established a maximum and minimum quantity. The standard quantity that should be maintained of any particular item can best be regulated by the records of use. The maximum quantity is the amount to be purchased when material is at the minimum, and this minimum consists of sufficient material to serve the ordinary requirements for one month. The maximum therefore would be an approximate three months' supply permitting an actual stock turnover four times a year. It is assumed that the material and supplies held in storage are only to operate and maintain the different branches of the gas utility. Construction requirements must be made a separate issue.

It is advisable to classify material and supplies, and the following captions suggest classes which have been successfully established and used:

PRODUCTION SUPPLIES—consisting of those items purchased for use at the gas manufacturing plant.

DISTRIBUTION SUPPLIES—all items carried for use in construction of and maintaining gas mains, service, etc.

METERS—consisting of gas meters carried in stock only.

APPLIANCES—gas ranges and other appliances carried in storeroom for resale to consumers.

MERCHANDISE ON DISPLAY—consisting of appliances which are stored at the office building where consumers inspect and salesmen dispose.

SUNDRY MATERIAL—miscellaneous supplies which cannot be readily included in classifications hitherto given.

The method of receiving described here may seem irregular to many officials of the gas utilities who heretofore have used special material receipts to inform accounting departments that certain materials have arrived and should be paid for.

Instead of preparing a separate receiving record, which more often than not has been the custom, this system requires that storekeepers obtain from merchants and manufacturers invoices for such supplies purchased, and after approval, usually by rubber stamp, the invoice is sent to the accounting department for payment, while duplicate is retained by the storekeeper

for reference and for the purpose of establishing costs. Invoices and orders refer one to another.

It has been suggested by various representatives of accounting departments that it is advisable for storekeepers to prepare material receiving records without the knowledge of what is actually shipped in any one or various lots. The idea was to oblige the storekeeper to check the material, and the office would know it was checked, otherwise it might not agree with quantities shown on invoice.

It has been proven through practice, however, that this is a fallacy more harmful than beneficial, for storekeepers, above all other employes of the company, should know cost of items, when shipped, what quantities to expect, and every detail throughout, for it is only by such information that storekeepers can prepare for the duties of serving various departments as required.

It is to be noted as well that, by the use of properly approved invoices, the necessity of duplicating is eliminated, this duplication occurring when a separate receiving record is prepared. The accounting department has a complete record of the transaction on one document, and the need for filing space for the extra receiving record as well as the time required to sort invoices and combine them with receiving records is abolished.

It is inadvisable to suggest any special forms for the purpose of withdrawing material from storerooms. It is necessary, however, to use a form which provides space to list various items, quantities of each, unit price, item number, and a full description of how the material is to be used. Similar information is required regarding material returned to storerooms, except that an explanation concerning the source of material returned is necessary, that is, whether removed from production plant, mains, services, etc. and whether the material was recovered during construction, maintenance or operating functions.

FORM 1.

.....
DATE .....
ITEMS RECEIVED—NOS. .....
INVOICE PASSED .....
AMOUNT INVOICE .....
AMOUNT TRANSPORTATION .....
FREIGHT OR EXPRESS BILL PASSED..
CLASSES OF STOCK .....
REMARKS .....
.....

Rubber Stamp Used on Purchase Orders in Stores Department for Reference Relative to Dates Items Were Received and Invoices and Transportation Bills Were Passed to Accounting Department.

One form for obtaining material from the stores department should be adopted and no other accepted. Neither should verbal orders be recognized. Every article in stock should be identified by an item number, and these numbers should be appended opposite respective items on every document which reports material received into or issued from storeroom, as it is by these item numbers arranged in numerical sequence under various classifications of material and supplies, that all stores office records are kept.

"Item numbers" are appended to items by the employe who receives or issues material at the time each transaction takes place. Unit prices are appended to items recorded on receiving and issuing documents at the time stock records are posted. Duplicate copies of all documents sent to the accounting department, signed by employes who receive material from storeroom, should be retained by the storekeeper. The outline of a form offering a medium on which to record complete information regarding all material transactions in storerooms is inserted on the following page (Form 2). After storeroom records are prepared, receiving and issuing documents are sent to the accounting department, where the following routine is dispatched.

When the accounting department receives orders describing material issued from stock and how it is to be used (this information, by the way, must be sufficient for the accounting department to decide intelligently to which of various accounts the costs of the material should be

debited; or, in the case of credit memoranda for material returned to stock, to which account credited), a summary or analysis of the items should be prepared on a form which provides space for description of different items, the quantities, order or credit memo number, unit costs of each item and total cost. One sheet for each account affected should be prepared each month to reflect the total debit or credit to that account for material and supplies issued from or returned to stores during the month. From these sheets an accurate journal entry can be prepared. (See Form 3.)

A report should be made by the storekeeper to the purchasing department at least every six months regarding the surplus or excess material in stock. This report should show the items in excess of requirements in storage, as well as items retired from service and not included with stores accounts. Complete specifications of items should be given with condition described; explanations as to why not in use, if new, or why removed, if second hand, and the present value as well as the estimated original value of same.

In order to protect the storekeeper from having dormant, obsolete or surplus stock which has been ordered by various employes who have the authority to do so, the storekeeper is privileged to report to the general manager when such conditions are discovered and the material not used as expected. The practice of any department head ordering in excess of actual requirements should be regulated, and this is one manner which has proven satisfactory in overcoming the evil.

The material and supplies of any gas utility should be the concern of the general storekeeper from the time received until in actual service, and his duties, therefore, frequently take him outside of the storeroom. It is not uncommon to find quantities of various items used in operation of the gas utility in the streets where mains and services have been installed or in hidden corners of a production plant. These items, withdrawn from stores in quantities beyond requirements, are left by workmen who fail to return the over supply to the storeroom when work is completed.

The disposition of accumulated scrap is also the task of the storekeeper after bids are approved by the local manager. Scrap material should be sorted carefully so full value can be obtained when sold, and sales to ordinary junk collectors should be made on terms which require payment by cash or certified check in advance of delivery of scrap in amount equivalent to estimated value of scrap to be sold. Adjustments of resulting differ-

FORM 2

ITEM NO.	ARTICLE	SECTION	SURPLUS

STOCK RECORD

MAXIMUM_____

MINIMUM_____

DATE	ORDER NO.	IN	OUT	COST	ON HAND	DATE	ORDER NO.	IN	OUT	COST	ON HAND

This Information Applied to a Card Form Usually 8" x 5" Will Furnish Complete Reference Regarding Every Transaction Pertaining to the Items Involved. The Form Is Printed the Same on Both Sides.

SUMMARY OF MATERIAL AND SUPPLIES ISSUED FROM AND RETURNED TO STOCK.

MATERIAL	STORES ORDER OR CREDIT MEMO NUMBERS						ITEM NUMBER	TOTAL	UNIT COST	TOTAL COST
	7	15	21	40	52	59				
3/4" Gas Cocks Iron Body	3		9		2		B80	14	.81	11 34
3/4 K D Pipe Tee	2	1				4	B61	7	.041	28
3/4" Union Elbow		4		2		1	G80	7	.032	22
3/4" Tee	2		9	1			B70	13	.074	96
								total		12 81

Credit - Material & Supplies
Distributing Apparatus
$12.81

Maint. Storeroom A Month of October 1925 Account No. 37 Title Maintenance of Gas Services

Compiled by: OR Extended by: OR Verified by: B Improvement Requisition No. =

Outline of Form to Be Used to Distribute Values of Items to Various Accounts According to Use. One or More Sheets Are Prepared for Each Account Debited and Separate Sheets for Each Account Credited. Debit Sheets Are Prepared with Black Ink. Credit Sheets Are Prepared with Red Ink. Suggested Size of Sheet, 8½" x 13".

ences in value can be readily made after actual weights are determined.

In every gas utility there is a constant loss of tools. The manager should request that the head of each department prepare an inventory of all tools and utensils which are the property of the company loaned to employes in connection with their work. These inventories must be signed by the employes who have the use of the articles and must be delivered to the storekeeper as a permanent record and altered as new purchases are made to replace items worn out or broken. An inventory by employes using equipment of this nature is made every three or four months and submitted to the storekeeper to compare and follow up.

Constant checking is the secret of a good share of success in keeping stock. Inventory process consists of the actual count of various items in material so that everything is counted during one month. The general idea consists of outlining certain portions of the storeroom and checking a proportion each day, covering it all over a given period. In this way errors will be detected before becoming too remote, and all sorts of irregularities will promptly present themselves.

A change in method of keeping records of gas meters eliminates the duplication of records maintained by the storekeeper and the triplicate records often kept in or by the accounting department. It is assumed, however, that every gas utility has a complete history of each meter as purchased from the time received until destroyed or salvaged. These meter history cards are prepared primarily for the information of meter departments, and it has been found practical to indicate on each card, besides the other information, such as the serial number, manufacture, the type, date purchased, installed, date tested, etc., the price actually paid for the meter, and each meter is always recorded issued from stock or returned to stock as the actual work is performed.

The price of a meter is always accurately established under this system, and any discrepancy in quantity is avoided,

while the discrepancies in value can be traced to individual items. To do this, it is necessary that the meter department check the meters in stock often and with regularity, submitting an itemized inventory of such meters at close of each month, so the actual value of same can be adjusted with the book value.

Perhaps one of the most difficult tasks the storekeeper has by way of keeping check is in connection with the sales department in accounting for gas ranges and appliances stored, usually in the office of the utility, and therefore only remotely controlled. To keep a possible accurate check, it is advisable to establish a form which permits a daily report of such merchandise used for demonstration and sale and to report items issued from the display room each day, insisting upon an accurate actual inventory at least once a week.

For use at such times when the storeroom may be closed, an emergency stock must be provided outside of storerooms, accessible to all employes who do emergency work. The local superintendent can determine of what this should consist, and the duty of keeping standard quantities on hand assigned the foreman who supervises the employes using the material. The storekeeper should make a periodic inspection of this stock. Such stock, of course, is for the ordinary emergency, and its value should be debited to proper operating or maintenance accounts when issued from storeroom.

Until recently, the stores department of gas utilities in general for some unknown reason, has been considered secondary to every other department. Lately our utility executives have learned that the stores department offers great opportunity for the practice of economy, and, since it is the one branch of every utility which is at the service of every department, an orderly, well-controlled stores division, efficiently operated, suggests the use of the principles of order and economy by other departments. For these and other reasons capable executives now consider their stores department a bank of the company where cash in material form is stored and protected and, by observing the general condition of the stores department, one can conclude whether or not a public utility is modern and progressive.

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TWO SIDES OF THE SAME PICTURE

IT'S DISGRACEFUL THE WAY HE ACTS WHEN SHE IS SO BAD, THEY EVEN SAY HE'S "PUPPY" AROUND WITH ANOTHER
COAL MINERS
MINE OPERATORS
MINERS
HOME HEATING PUBLIC

Doctors Had Better Cure Their Patient.
From Scranton (Pa.) Republican.

The Substitute.
From New York Evening World.

Support Your Trade Press

Read Them and Use Them—They Deserve Your Help

By ALEXANDER FORWARD

IT is an axiom of modern organization that an industry cannot grow faster than its trade press. The adequacy of trade papers to fulfill their task is dependent upon the support they receive. Sometimes a publication is far ahead of the industry whose progress it records, but it cannot long remain so.

The gas industry has been, and is, particularly fortunate in the character of its trade publications. The service rendered by the *Gas Age-Record, The American Gas Journal, Gas Industry, Western Gas, The Intercolonial Gas Journal of Canada, Industrial Gas* (not to mention here the journals published abroad) is invaluable. Their editors are alert, forward-looking, conservatively progressive, energetic and thoroughly co-operative.

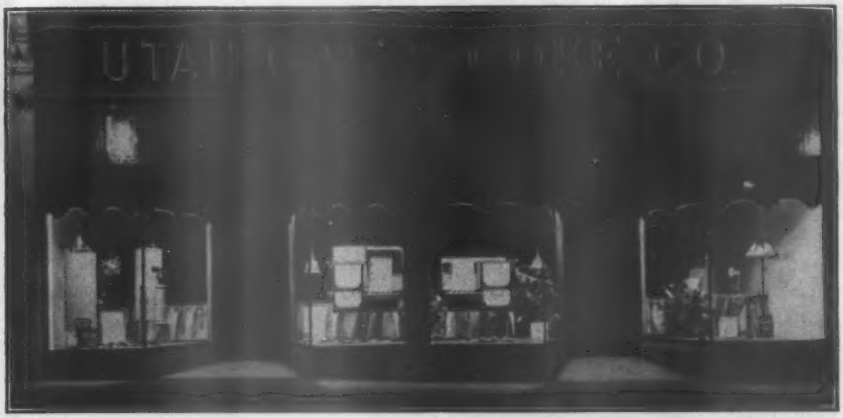
Modern executives, appraising the possibilities of their employes for larger service, never fail to take into account the extent to which these men keep their information up to date. They well know that he who stops reading and learning when he leaves school is destined to remain in a subordinate position. As Mr. Earl Hodges indicates in his article in this issue, the man or woman whose promotion will be steady and who is headed for the top in his line is the man or woman whose education is never complete. A striking example of the truth of this proposition is afforded by the life of that outstanding figure, the late Mr. Charles H. Nettleton, who read and learned to the last day of his life.

The dissemination of information conducted by trade papers cannot be duplicated in any other way, for the trade press is the mirror of our progress.

Where There's a Will There's Househeating

This and Other Fields for Gas Service Need a Little of "The Will To Do"

By GEORGE L. HORNING, Utah Gas & Coke Company



AS APPLIANCES ARE DISPLAYED AT NIGHT

Moving Into New Quarters Was One of the Steps Taken by This Company Towards Bigger and Better Business.

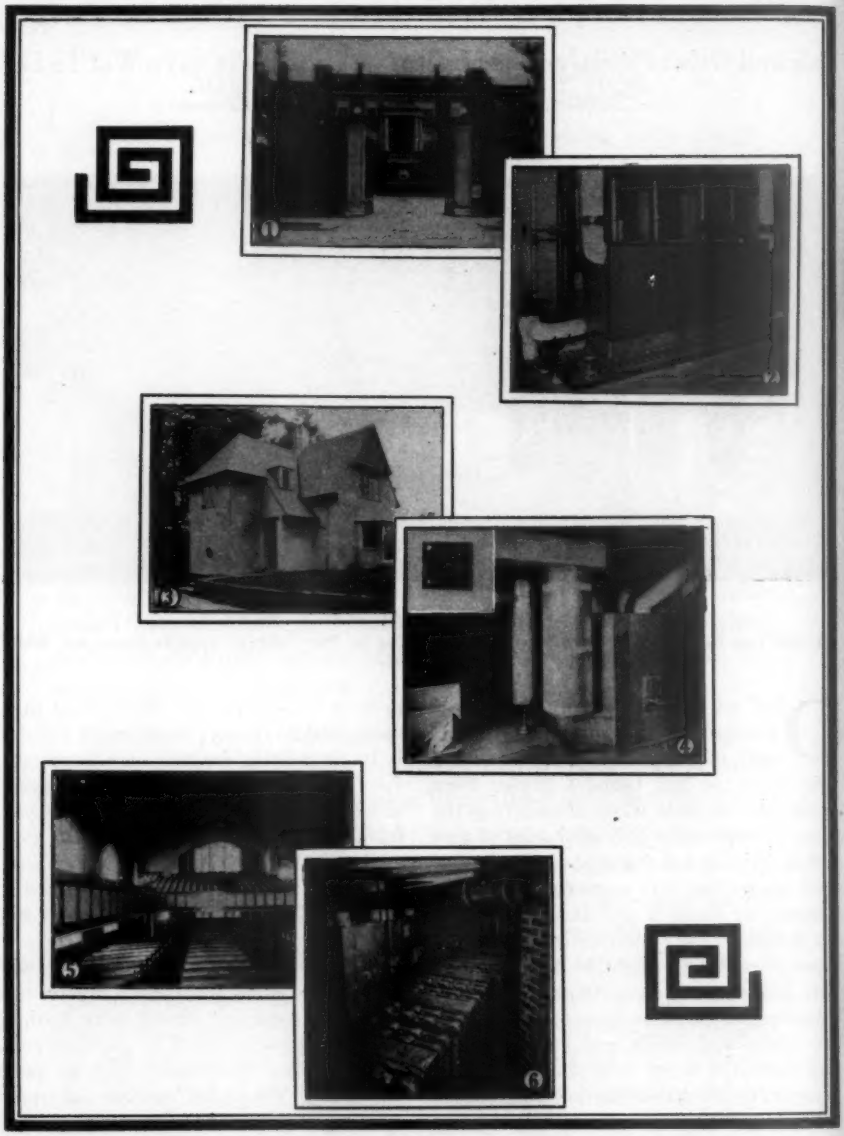
ONE of the greatest drawbacks gas companies have had to contend with in the problems of increasing their business has been, I think, their pessimistic attitude when considering the effect of materially increased sales of gas.

It is my belief that the gas industry has been altogether too conservative in its methods of thought and has not seemed to visualize the possibilities nor how those possibilities might be turned to its own advantage. In consequence it has been more or less backward in adopting new ideas and ideals and has made the way hard for those who did have sufficient foresight to dream of possibilities and then attempt to make their dreams come true. There is no question but that the way to do a thing is to do it.

A few years ago the American Gas Association was told by engineers that the gas industry could not hope to do a house heating business, and yet I think it realizes to-day that, whether it wants to heat houses or not, it is going to be compelled to do so. How much better it is to do a thing because you have carefully figured on doing it and the ways of accomplishing it than it is to have your hand forced and be compelled to do it against what you think is your better judgment. Is it not better to make up your mind that it can be done and then find some way to do it?

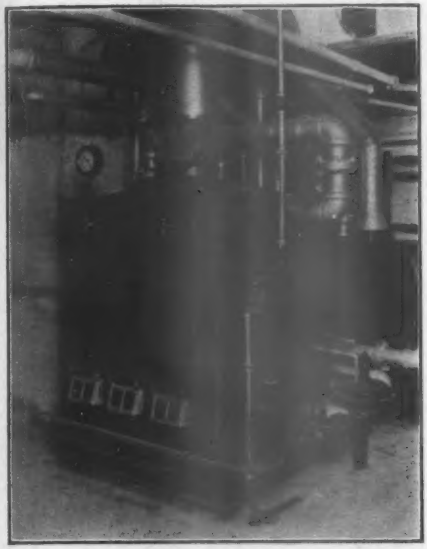
When the gas industry discovered—about the time that the electric man started to take our illuminating business—that its product could be used for cooking purposes, there were just as many "Doubting Thomases" on the subject of cooking as there are now on the subject of newer fields for gas. Considerations for such opposition at that time probably had just as much basis in fact as opposition to an enlarged program for the industry has at the present time.

We know what the result was. People to-day consider gas for cooking a neces-



1-2. Residence and Heating Equipment of the Hon. Henry White, Former Ambassador to England. 3-4. An Interesting Installation from Portland, Oregon. Square Insert in Picture of Furnace Room Shows an Artistic Grille for the Warm Air Inlet, Opening on the Billiard Room, Which Is on the Same Level with the Furnace. The Return from This Room to the Furnace Is Taken from the Base Board. 5-6. Installation in the Rose City Park Methodist Church, Portland, Oregon, Designed to Raise Temperature to 65° in Six Hours When Outside Temperature Is 25.° There Is a Surplus Available to Heat Air for Ventilation.

sity and would laugh at anyone who would say the business could not be taken care of. There is an old but true saying, "where there is a will there is a way." If we are going to be forced to take this business whether we make up our minds to do so or not in advance, we had better



One of Two Gas Furnaces Which Heat the New Building of the Utah Gas & Coke Company. The Basement Is Open to Inspection by the Public.

set about doing it and considering what steps we are going to take, not only to make its addition a physical possibility, but also to make it a remunerative one.

Let us assume for a moment that our gas company has practically a saturated territory for domestic cooking appliances, and that our former illuminating load is practically non-existent. What, then, lies ahead? It has been but a comparatively few years that any thought was given to supplying gas for industrial purposes. Yet, after a few had tried it, the rest of us found it a fertile field.

Not every community has any great possibilities for the sale of gas for industrial purposes, due, perhaps, to the non-existence of industries or to the existence of industries which do not have any large demands for heat. There is, however, a tremendous unsold field for the use of heat which exists for every gas company regardless of its location in this country. This field is that of domestic house heating.

Any people educated to the standard of personal cleanliness adopted by the American nation require tremendous volumes of hot water. Therein lies another large field which has been sold to a very limited extent.

Nearly every community has some field for the use of gas for purposes other than a strictly domestic one. Have you considered, not whether you can supply the fields, but how you are going to do it? No matter what field you attempt to supply you have a different kind of competition to meet. In an industrial field you usually have low cost of coal, but high production cost due to low plant output. Is there not a price at which you can sell gas that will supply the fuel need of that industry which, when considered with all of the other factors which go into the cost of the article produced, will decrease your customers' manufacturing costs and at the same time return you a profit?

Is there not a price at which you can sell gas for water heating to any and all customers which will enable them, all needs considered, to use your service at lower total cost than that at which they are now getting an inferior service, and at the same time make a profit for yourself?

Is there not a price at which you can sell house heating at which, though the customer pays more for gas than he would for coal, he will effect an economy because of the elimination in his home of large quantities of a dirt-producing material and the abolishment, so far as he is concerned, of any labor; and can you make a profit on the gas sold him for this purpose?

My own answer to the above and similar questions, which may be asked by any gas man in the country, is in the affirmative. I think that one thing which has been a deterrent in giving active con-

1. Pipeless Gas Furnace, Vancouver, B. C., Heats Six-Room Bungalow. Cost Averages $12.10 Per Month from October to February, with Gas at Sixty to Seventy-five cents Per M. 2. Washington Monument, Baltimore, Md., Heated with Gas-Fired Warm Air System. 3. Gas-Fired Boiler Supplies Steam to Drying Cabinet and Large Absorber in University of Illinois. 4. The Northern Indiana Gas & Electric Company Is Another That Takes Its Own Medicine. This Unit Is in the Basement of the New Office Building at Hammond, Ind., and Is Open for Public Inspection. 5. Said to Be World's Largest Gas-Fired Heating Plant, Installed in Los Angeles Chamber of Commerce Building, Supplies All Steam Required for Heating, Cooking and Hot Water Heating. 6. Club House of Baltimore Stadium Heated with 19-Section Gas-Steam Boiler. Water Is Heated with 500-Gallon Gas Storage System.

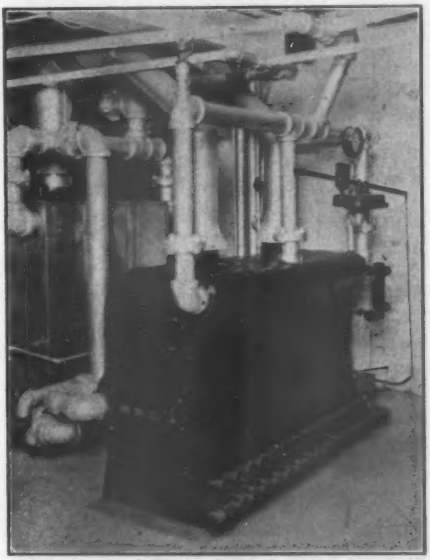
sideration to these matters by the industry has been a failure to realize that practically all of this contemplated business is business which we do not now have to any extent on our lines. The acquisition of this business, therefore, it seems to me, can be considered from the theoretical viewpoint so far as the rate structure is considered. That is, the attraction of such business to our companies must, of course, depend to a very great extent on the cost at which we sell our service and consequent cost to the customer.

We all know by this time that the ordinary gas rate schedule represents very largely an average so arranged that the average result of the application of those schedules to all the customers on the lines pays the company a presumably fair rate of return on its investment. A study of the situation, however, discloses the fact that by far the larger portion of the average gas company's customers is carried at an actual loss; that another portion occasions no direct loss, but on the other hand pays no profits; and that a third portion, a very small part of the total, pays not only a profit on its own consumption, but also takes up the losses on the other classes of customers.

Therefore, until rate schedules are generally revised so as to be more equitable as between all classes of customers, we may have to content ourselves with seeking business which we do not now have or which we have to a limited extent only and apply to such uses a more or less theoretically correct rate, so devised that each customer on it will pay his own way plus a fair return.

It is probably true that we do not yet know the last word in relation to the theoretically correct schedule of rates and how to work it out for any given company, but we do know sufficient from the studies which have been given the three-part rate by the American Gas Association committee to have a fairly close approximation of it. Any rate which will create an economy for the customer and pay the gas company more than the theoretical rate will enable that company eventually to make a general reduction in all rates that may be too high, or, on the other hand, increase its distribution of dividends to its stockholders.

For this reason, I believe in determining first the theoretically correct rate at



Utah Gas & Coke Company Installed Two Types of Gas Furnaces in Its New Building for Demonstration Purposes. Heating System Is Controlled Thermostatically and Fitted with Extra Sensitive Gas Controls for Vapor Operation.

which the company can do business with a profit, and with this rate in mind, find what non-existent business there may be that can be supplied at a rate higher than the theoretically correct one and establish a rate that will get the business.

I believe we have too long remained on single schedules for gas in each community. It seems to me the controlling factors in the establishment of rates to get the business are whether the rate is remunerative and whether it is discriminatory. The fact that the company establishes several different rates does not of itself answer questions of this nature.

Is it not the truth that a wholesaler can handle more goods with a smaller margin of profit than a retailer for the same vol-

ume of business? Can you not, at a lower cost to you per unit, serve a home where the gross return to you per annum is $500 than where it is $30? That is what happens when you turn an ordinary domestic user over to a reasonably sized house heating installation.

I seem to hear someone say, "that is all very nice, but what about the peak load?" In the first place, the cost of serving your peak load in a properly designed rate is taken care of in the demand charge. Why, therefore, should you worry what the peak load is? Naturally, to determine a proper load or demand charge you must have a fair idea of the diversity factor. The higher the diversity factor the lower in consequence becomes your demand charge.

When we first undertook some heating business in Salt Lake City, we were disturbed at the possible load factor because of the very seasonal nature of the heating business and because of the high instantaneous demand that would, we thought, be occasioned on a particularly cold morning. The usual practice in the home using solid fuel is to bank the fire about 10 p.m., and at some given hour, usually between 5 and 7 a.m., to start the furnace booming along at its maximum possible capacity so as to bring the general temperature of the house up to normal in as short a time as possible. During the night the general temperature of the house might drop 20 or 25 degrees below the normal day temperature.

When we started heating with gas we soon found that to do likewise was uneconomical for the customer and did not give him the heating service to which he and we thought he was entitled. All our installations at the present time are operating on a maximum difference between day and night temperature of 5 degrees.

I have recently seen an article which claimed that the most economical results could be obtained by simply shutting the heat from the bedrooms, opening the windows if ventilation was desired, and maintaining the general temperature of the house at the same point during the night as during the day. If this is so, and I have no great reason to disbelieve it, the diversity factor for heating will materially increase, and conversely your peak load will materially decrease. With a 5-degree difference between day and night temperatures, we find our annual load factor for heating installations is approximately 26 per cent, which, I think you will agree, is a very desirable business, as the average industrial business does not give you an annual load factor much, if any, in excess of 30 per cent; and the ordinary domestic customer's load factor is from 5 per cent to 9 per cent.

There are just two things, it seems to me, in which the customer has to be educated to make gas heating a very desirable business. One of these is to educate him to the advisability, so far as his own pocketbook is concerned, of reducing his demand to the minimum. This can readily be done by allowing sufficient time in the morning before his usual hour of arising for the house to reach practically normal temperatures or to maintain a fixed temperature at all times in the general living quarters, the furnace being controlled by an automatic thermostat. The second is to educate him to the value of paying more for gas considered simply as a fuel as compared with coal considered likewise. This is really the first thing you have to do, and once done, the probabilities are that, if he can at all afford the price, he would not go back to a solid fuel.

The largest essential on any of these big jobs, whether they be house heating, water heating, or industrial, is to limit the demand and get paid for all of the demand which the customer places on your lines, thereby enabling you to pay interest on the cost of the installation which he has made it necessary for you to make for his service. When you limit his demand and make him pay for that which he occasions, you very soon attain a desirable load factor and desirable business.

A Unique Gas Holder from Sunny Spain

Specifications May Not Be Standard, but Anyhow, It Holds the Gas

By A. GORDON KING, Service Engineer, A. G. A.

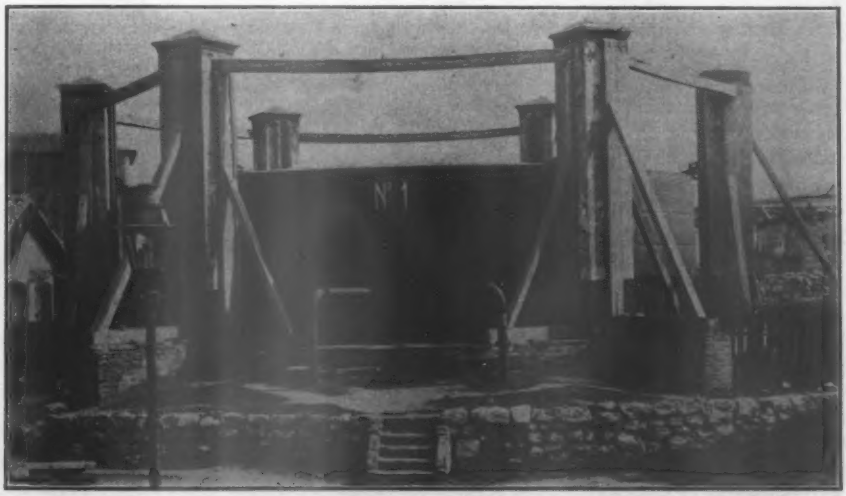
OUR editor scented a story in the following letter by Ernest F. Hooper of the Phoenix Iron Works to the English *Gas World* last March.

"When recently travelling in Spain, I passed through the old town of Burgos," Mr. Hooper wrote, "and happened to catch sight of a gas-holder which I should fancy must be almost unique. Apparently it was put together with small wrought iron plates, as these were all very small, and the columns to support the lifting sections were built of brick. I have never seen the like elsewhere, and wonder if any of your readers know of any other examples."

Through the courtesy and helpful co-operation of H. M. Wolcott, the American Consul at Bilbao, we are able to reproduce a photograph of this unique structure; details of construction unfortunately could not be furnished, but it will be noted that the plates are unusually small and that the columns are built of brick covered with cement or plaster. The horizontal girders are wood, and each brick column is buttressed by three wooden angle braces.

The radial rollers and carriages, two visible at the extreme right and left of the photograph, are of metal, while the vertical guide channels attached to the columns apparently are constructed of wood. The tank is of special brick, much like tiles in appearance and dimensions.

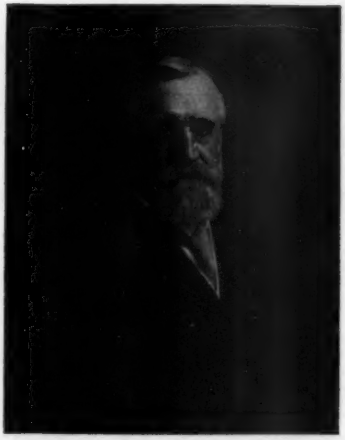
Of particular interest are the inlet and outlet pipes (E for *Entrada* or inlet, and S for *Salida* or outlet) connected with the interior of the holder by two vertical pipes between the outside of the bell and the tank. A drip pump can be seen between these pipes at the edge of the tank.



NO, THIS IS NOT AN OLD MOORISH RUIN

It Illustrates the Extent to Which Local Ingenuity May Be Called Upon to Supply a Modern Necessity.

Charles H. Nettleton



CHARLES HINE NETTLETON, one of the "old guard", and president of the New Haven Gas Light Company, died the morning of Oct. 29 of heart failure. During the summer Mr. Nettleton had celebrated his 75th birthday and the completion of 55 years of continuous activity devoted to gas service. He was the oldest living pioneer in the manufactured gas industry in America.

Among other positions, Mr. Nettleton was a past president of the American Gas Light Association and of the New England Association of Gas Engineers. He was a member of the American Gas Association, the Guild of Gas Engineers and was president of the Society of Gas Lighting.

When Mr. Nettleton graduated from college, he undertook to resuscitate the Mount Vernon, N. Y., gas works from slow death. But, in 1870, gas making methods were primitive and gas lighting still a luxury of the rich. Nearby New York gas companies were charging the now exorbitant rate of $4 a 1000 feet, but even that was not sufficient to tide over the Mount Vernon plant. The efforts of Mr. Nettleton were such that the company rewarded him by making him secretary.

In 1871 he went to Derby in charge of construction of the gas works at that place, and, from the organization of the Derby Gas Company, was its secretary and treasurer, which offices he held until elected president and treasurer in 1900. These last two offices he held to his death.

His progressive spirit, foresight and judgment were notably shown by the following two facts: He caused the Derby Gas Company to go into the electric business as far back as 1885, thus forming one of the first examples of a combination gas and electric company in the world. He also had the distinction of having read the first paper before the American gas industry on "Cooking by Gas."

Mr. Nettleton was born in New Haven, June 29, 1850, the son of Charles Nettleton, a lawyer by profession and founder of the Derby and Mount Vernon gas companies. His early education was obtained in New York, his boyhood home, and at the Gunnery School, Washington, Conn. Later he took a scientific course at the College of the City of New York, taking the degree of B.S. in 1870.

From 1890 to 1891 he was president of the American Gas Company of Philadelphia. He was made president of the New Haven Gas Light Company in 1900. He was a member of Phi Beta Kappa and Alpha Delta Phi fraternities. He belonged to the Graduates, Quinnipiack, Lawn and Country Clubs of New Haven, the Lotus and Alpha Delta Phi Clubs of New York, the Mastigouche Fish and Game Club of Canada, of which he was president nine years, and was a 32nd degree Mason and Knight Templar.

Charles H. Nettleton, An Appreciation

By DANA D. BARNUM

The strength of righteousness was never better exemplified than in the character of Mr. Nettleton, and no man ever lived up to the Golden Rule to a greater extent. Through a long life of activities in many fields, and particularly that of public service, he walked as straight morally and mentally as he did physically, and his strong, sturdy figure was a personification of mental, moral and religious uprightness.

No one ever asked Mr. Nettleton for advice or assistance without having the sympathy of his generous and kindly nature. His character will stand as an inspiration and guide to his younger associates, and they will all be thankful for having known him. I know of no one who has lived a more complete and useful life.

Is the Gas Man Keeping Abreast of His Time?

More Piano Movers and Fewer Stool Carriers Needed in the Business

By EARL W. HODGES, Henry L. Doherty & Company

Earle W. Hodges

IT is my personal opinion, formed from fairly close observation over the country generally, that gas executives pay entirely too little attention to their own technical or trade publications. I have yet to find one gas company executive in the average sized city who keeps his monthly or weekly gas publications conveniently filed. I have found very few of them, after much questioning, who carefully read these magazines as they reach the office. In my own judgment this is a very serious mistake, and the gas company executive really is cheating both himself and his company.

The most highly trained technical and practical minds of America and of the world are continuously writing for these magazines upon subjects and matters of vital interest to the vice-president, the general manager and other department heads. How can this information possibly be used or made useful to those who need it unless the executives of the company keep posted themselves?

Just because a gas man may have known the technical side of the industry fifteen years ago, and because he has had continuous practical experience since that time, does not mean that he can remain up to the minute in service, in new uses and late appliances, unless he avail himself of the very helpful information of the "post-graduate courses" that come to him weekly or monthly through his own trade magazines. Specialized and systematic reading is a most refreshing and helpful habit, and one that all of us might cultivate with profit. It is not a costly habit, and, unlike both love and life insurance, the expense does not increase with passing years.

I would urge that each gas company subscribe for at least one dozen copies each issue of two or three of the leading publications of the industry. These copies should go to those to whom they will prove the most valuable in absorbing and transmitting the information down the line. Even the advertisements in these magazines are highly informative and extremely interesting. No magazine can prosper long without readers, and technical publications of this nature are published almost exclusively with the idea and hope that they will interest executives of the gas industry.

Certainly such a publication, regardless of its timely worth to those in the industry, could not be expected to reach any great number of laymen. The average banker would not consider it in his line, nor would an attorney be expected to take it home at night, to read along with his family Bible. The merchant would find little of general appeal in its columns, and the undertaker would perhaps much prefer to scan the growing list of motor and moonshine deaths in the daily paper.

It is really a matter of genuine interest to the gas man if he expects to keep himself thoroughly posted upon what is going on in his own industry. Imagine an attorney not keeping up with State and Federal court opinions as they are printed in the weekly law journals and later in bound volumes, and try to visualize an investment banker who never even glances at security quotations or the market prices of bonds! If the gas industry has at all been lagging in spirit and activities for several years, one of the

main reasons is that the executive heads of the various gas concerns have not been keeping abreast of the times.

Another sensible reminder is that the gas company executive should keep in as close touch as possible with his own national organization, the American Gas Association. This organization has grown under many handicaps on account of apparent lack of interest and co-operation, and yet it has worked wonders for the industry in numerous ways. The American Gas Association is the clearing house of news of the industry. Its own executives are able, efficient and experienced, and they are solving problems daily for gas concerns and for the general public all over America.

Along very similar lines is the work which is being so efficiently done by the various state utility information bureaus. These bureaus as a whole constitute the most constructive step in public relations and good will building ever undertaken by the utility industry. The result of their individual and combined efforts speaks for itself.

Yet my own knowledge of the situation permits the truthful assertion that many large and small gas companies do not affiliate with or assist in the maintenance of these bureaus. This applies to gas concerns of all kinds—manufactured gas, natural gas, and pipe line companies. I trust the present situation will not long continue. The bureaus are directed by very capable men, and they should have the hearty moral and material support of the gas operators.

There's a splendid job being done and a huge one ahead of us, so let's get busy.

McCarter Medals for the West

McCARTER Medals have been awarded and will shortly be presented to John P. Meehan and Steve Repovich, both of the Pacific Gas and Electric Company, for promptness in saving the lives of two fellow employes.

Gus Eriksson and Carl Jacobson, gas serviceman and gas serviceman's helper respectively, were engaged in cleaning

Steve Repovich—John P. Meehan

screens on a gas governor at the company's meter house on the State Highway in Palo Alto on May 13, when they were suddenly overcome by gas fumes. Repovich and Meehan, foreman and truck driver respectively of the electric department, happened to be on the scene, and each immediately started to work on the two victims, while another employe hastily summoned a doctor.

Within fifteen to twenty minutes both victims were able to breathe without assistance and were taken to a hospital by order of the physician. Owing to the prompt and energetic manner with which their rescuers administered the Schafer Prone Pressure Method of resuscitation, both men were fully recovered in a few hours and were able to report for work the following morning.

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This Is an Advertisement—Read It!

A limited number of copies of the 16-page booklet, "A Growing Industry", published by the Utility Securities Company, is available for distribution at A. G. A. Headquarters. Copies will be supplied to interested parties on request.

The librarian of the Massachusetts Institute of Technology would like to obtain a copy of the 1916 proceedings of the A. G. A. Any one willing to dispose of his copy should communicate immediately with the editor of the MONTHLY.

Reconstruction of a 1,500,000 Foot Holder

Life of Huge Tank Prolonged 15 Years Without Interruption of Service

By R. M. McCALLEY, Portland Gas & Coke Company, Portland, Oregon

THE Portland Gas & Coke Company's district holder No. 3 was erected in 1905. The holder was built on ground which had been filled in some years previously, the depth of the fill at the holder site varying from 8 to 20 feet, with the heavier fill toward the east. Piles thirty to fifty ft. long were driven over the entire area, spaced 2 ft. 6 in. on centers around the outer ring, and 3 ft. on centers throughout the interior section. An 18-inch concrete mat with a 24-inch outer ring was laid over the piling.

Fig. 1. A General View of the Trouble Showing Settlement Towards the East.

The guide frame columns were of the web plate and angle iron type with bosom plates fifteen inches in length, having four bolts on each side of the joint. There were three of these bolted joints in each of the fifteen columns. The diagonals were round bars with threaded clevises at each end and the circumferential struts were of the lattice web and angle type. No wind ties were provided at the top of the framework.

After the holder was erected, settlement of the east half of the foundation began, allowing a portion of the tank bottom to drop, thereby throwing the guide frame out of alignment. In order to correct this condition, the holder was taken out of service and the tank leveled by wedging and jacking up the bottom. Sand and cement grout was then run between the bottom of the tank and the original concrete mat.

After this levelling operation, further settlement occurred, until, in 1923, the east edge of the tank was 3½ inches below the normal level. This settlement again caused distortion of the guide frame, which was aggravated by the lack of wind ties at the top of the frame and by snow and ice loads on the stairways, the latter being hung on cantilever beams fastened to the east columns. As a result of these combined stresses, the frame became egg-shaped and spirally twisted. The column on the east side which formed the principal support for the stairways was found to be eight inches out of alignment. (See Figure 1.)

A survey of the holder was made to determine the actual condition of the structure; the columns were tested to determine the deviation from the true alignment and the twist in each. All were found leaning to the east and several showed considerable twist. Neither the amount out of alignment nor the twist was uniform for the entire height of the columns, as the bolted joints allowed some degree of flexibility. On account of the leaning of the columns, the strains on the diagonal rods were unequal, some being slack and some taut. It was not possible to adjust these rods as the clevises were rusted to the rods and in most cases they had been tightened to the limit of the threads. The goosenecks and guide wheel carriages (Figures 2, 3 and 4) were found to be out of alignment and the guide rollers were, in some cases, as far as four inches away from the face of the column.

Fig. 2. Fig. 3. Fig. 4.
Goosenecks and Guide Wheel Carriages Found Out of Alignment and Guide Rollers in Some Cases Four Inches Away from Face of the Column.

The survey indicated that a part of the structural deformation was due to a lack of wind ties at the top of the holder, and also that the vibration from heavy trains and trucks had contributed to the same end.

A tentative plan for reconditioning the holder was drawn up, the following operations being included:

1 Install cable back stays on six columns.
2 Put up eight cable guyers and slings between the top of the columns to straighten columns.
3 Reverse angles at top of columns.
4 Burn off tops of columns to allow for gussett plates.
5 Ream holes and bolt up gussett plates for new wind ties.
6 Put up wind braces and adjust same.
7 Install diagonal bracing on three upper bents first.
8 Adjust all diagonal stays and plumb columns.
9 Rivet up all loose straps and joints after plumbing columns.
10 Set up and adjust all goosenecks and rollers.
11 Apply coat of red lead paint at all joints.

Conditions would not allow the holder to be taken out of service and it was necessary to so plan the work that all material, staging and tackle were kept out of the way of the operation of the lifts.

A consideration of the plan proposed indicated the possibility of causing undue stresses in some of the members of the guide frame by the reconstruction work, and a consulting structural engineer was employed to check the plan from the standpoint of safety to the structure.

It was brought out that the plumbing of the columns and guide frame to a true vertical position would result in considerable strains in the shells of the lifts on landing, on account of the condition of the bottom of the tank. The entire tank bottom had not settled uniformly, the west half being nearly level, practically all of the settlement having taken place in the east half. The result was that, as the lifts landed, they were distorted, the upper ring of the outer lift assuming the shape of an ellipse, with the major axis east and west. This caused the second lift to foul as it came down, as shown in Figure 5. All of the lifts inclined to the west instead of following the direction of settlement of the tank.

Fig. 5. Distortion of Landing Lifts Causes Second Lift to Foul.

In examination of the holder several places were found where the guide wheels were actually rubbing against the horizontal gusset plates. In two places this rubbing had cut the gusset plates back about 1/8 inch. The holder was operated up and down past these points of contact and the action carefully observed. It was found that the side guide wheels fouled against the gusset plate, and after a considerable strain, the wheel rolled past the plate. It was also found that a number of the set screws which hold the back collar on to the shaft of the side guide wheels fouled against the framework of the bolster at each revolution of the wheel. Several of the bolsters on the lower lift on the west side were found to be badly tilted upward.

One of the rollers operating on the bottom of the outer lift on the east side of the holder was found to be fouling against the inside of the tank. The holder was run up to its highest point, and an examination of this condition was made. As nearly as could be determined the bolster was sprung to one side so that the frame was riding on one flange of the channel guide. The guide wheel was

Fig. 6. Wind Ties Placed to Hold Frame in Position While Columns Are Being Plumbed.

found free, indicating that the entire pressure was exerted between the edge of the bolster and the flange of the channel.

The stairway fastenings were found in poor structural condition. The existing guys were fastened to U-shape stirrups in such a manner that undue strains would bend the stirrups to a considerable angle before full tension took place which might throw a considerable bending stress on the fastening to the columns.

Reconstruction work was begun by installing cable trusses on the backs of all of the columns made of one-inch cable, extending the full length of the columns with two at the third and two-third points. The original bolted column splice plates were removed and longer splices installed to stiffen the joints of the column. Eight horizontal cables with long turnbuckles were stretched between the tops of the columns, each cable being fastended to two diametrically opposite columns. The proper tension was then taken on the horizontal and vertical cables to bring the entire frame into a circular shape and to plumb each column. Wind ties were placed to hold the frame in position (Fig. 6).

The diagonal rods were temporarily replaced with cables and fitted with turnbuckles. Fig. 7 shows the temporary cable arrangement with the old rod still in place. On the side where the workman is standing can be seen the new rod installed with the turnbuckle located at a convenient height for adjustment. After turnbuckles were installed, the diagonals and wind ties were adjusted to bring the guide frame into the position desired. The stairway braces were reconstructed by lengthening the rods and installing direct connections to the cantilever beams supporting the landings.

The water level in the cups was lowered to a point just above where blowing commences, and the dam sheets extending eight inches above the curb were cut off with an acetylene torch one and one-half

Fig. 7. A Starry Perch, Showing Temporary Cable Arrangement with Old Rod Still in Place.

inches above the curb. New dam sheets were then riveted into place, using the remaining portion of the old dam sheets for fastening.

While the dam sheets were off, the inner surfaces of the cups and grip sheets were thoroughly scraped and painted. Deep pitting was found at the normal water level in the bottom course of each lift. A special study of paint for the cups was made; thirty different makes of paint were applied to different sections of the cups and a record kept of each.

Some of the old steam pipe removed from the cups during the course of the work was fouled under the grip sheets

Fig. 8. Lowering Adjustment Blocks under 35 Feet of Water.

and could not be removed until after the dam sheets had been cut off.

During the replacement of the dam sheets, the roller carriages were removed and reset. The carriages on the outer lift were provided with stiffener brackets to hold the wheels in place.

On checking up the result of the adjustment of the columns it was found that the guide frame had been brought almost into a true vertical condition, the columns being more nearly vertical than was desired, as the plan was to have them perpendicular to a base plane inclined somewhat to the horizontal. On account of the condition of the bottom of the tank, the fact that the guide frame had been made vertical caused a twisting of the outer lift on landing.

Fig. 9. Close-Up of Cast Steel Compensating Blocks Which Solved the Difficulty.

A survey of the tank bottom was made by taking soundings, six independent observations being taken of the depth of each landing block.

It was decided to install compensating landing blocks to bring all of the existing blocks up to a common level. The thickness of the block needed at each point was figured from the survey and temporary wooden blocks were made up. These wooden blocks were fastened to the under side of the bottom curb of the outer lift and the lift allowed to land. It landed almost level, and the distortion was eliminated.

The lift was again raised and the wooden blocks removed. Slight readjustments of the thickness of the blocks were made according to the degree of impression which had been made on them. Shingle nails were then driven part way into each block at the point of contact, and the blocks were again fitted into place and the lift allowed to land. The manner in which the shingle nails were pressed into the blocks indicated the degree of pressure on each block.

On the basis of the information gained permanent cast steel compensating blocks were designed to fit over the existing landing blocks; these compensating blocks provided a landing place for all three lifts.

The installation of the compensating blocks was entirely successful (Figures 8 and 9) and the three lifts now land in a proper horizontal position, with a uniform cup spacing. All of the fouling, scraping and distortion of the lifts formerly experienced has been eliminated.

The holder is now in good structural and operating condition and the work done is estimated to have increased the probable life of the structure at least fifteen years. The entire work of reconstruction was performed during the regular operation of the holder and without any interruption to service.

Gauging the Value of a Home Service Department

It Is What You Make It, and Should Be the Nucleus of Larger Activities

By MRS. LUELLA FISHER, The Eriez Stove and Manufacturing Company

Mrs. Luella Fisher

"OUT of the dusk came you." WHO? HOME SERVICE!

I have ofttimes wondered if every home service worker gets the real satisfaction out of her efforts that I have. Seven years ago a vocation for me was shrouded with dusk, until the need of greater education in public utilities attracted my attention. And thanks for the opportunities afforded me by the company that employed me. I there had the chance to prove what could be gained by personal contact.

The first value in Home Service, from my viewpoint, is to get the employes of the company well acquainted with their daily HOME. For after all, if we are a stranger in our own home, are we as earnest to be a part of it? Hence the necessity of creating this family atmosphere so that every employe will feel himself a main spoke in the wheel and that his duties if properly performed are just as important as that of the management.

After we have organized the family Home Service Department, the field work will be so much easier. The employes live in all different parts of the city and come from all different walks in life, therefore they can be of great value to the home service women in making contacts with the company's customers.

The home service women should be well trained in public utility affairs. Then their contacts will all be beneficial to their company. The cooking classes, radio work, school and club lectures all play their important parts in this great educational program.

And, while we have an audience, why can we not drive home more of the very important problems of the industry so that, when the voter goes to the polls, he will not cast his influence against our labors and his own welfare.

There is no limit to the value of the home service field. It is the avenue through which you meet your customers in a social way and are able to talk things over congenially. Women are now playing such an extensive part in the political world that we must be able to cope with them on technicalities.

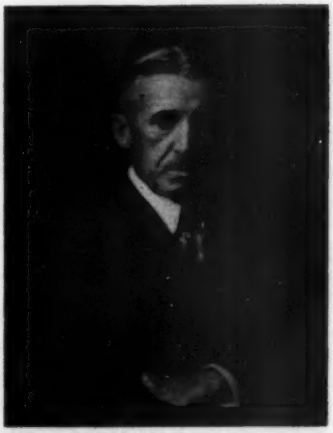
The First Value in Home Service Is to Get the Employes of the Company Well Acquainted with Their Daily Home

I recall a luncheon where some of the women from our city legal department, one of them being a judge, engaged in a very snappy discussion on the gas question. Again, hurrah for Home Service, with the knowledge I had to answer their technical questions and correct their erroneous ideas.

I should like to make a personal appeal to all gas companies, appliance manufacturers and controllers, that we all join and drive for the greatest service to our communities.

Alonzo T. Rand

By JOHN B. KLUMPP



A DEAN of the gas industry passes. Alonzo T. Rand, president of the Minneapolis Gas Light Company, died suddenly on October 31st while hunting with friends in the North Woods. The hunting party was about to end an outing which began several weeks before and which had taken Mr. Rand and his friends deep into the Canadian wilds, north of the Minnesota line. He appeared in good health, and according to the members of the party, seemed to have enjoyed his outing. He arose early Saturday morning to begin a final day's shooting, but had taken only a few steps from his cabin where he was found dead.

Mr. Rand, from his boyhood days until the time of his death, was intimately connected with the gas business. He was born in Buffalo, N. Y., August 9, 1854. His father, A. C. Rand, gained a national reputation as an inventor and producer of gas. He moved to Minneapolis in 1872, when he purchased the gas company in that city, and it was there that Alonzo T. entered the business as a boy eighteen years of age. He worked his way through all the various departments of the company, giving particular attention to the engineering details. He became president in 1901 and continued in that position until his death. He was associated with his brother, Rufus R., who died three years ago holding the position of vice-president and treasurer.

In the early days when game was plentiful in the outskirts of Minneapolis, Mr. Rand became a devotee of hunting and fishing and that became a life-long sport in which he found his greatest pleasure.

Mr. Rand was an outstanding factor in many business activities in the city of Minneapolis. His charities were numerous and in all his work he was modest as he was in private life.

Mr. Rand died leaving no family, but the management of the Minneapolis Gas Light Company will continue under the direction of his cousin, Arthur H. Rand, and his nephew, Rufus R. Rand, Jr.

Bernhard R. Ahrendt

BERNHARD R. AHRENDT died suddenly at his home, 79 Glenwood Boulevard, Mansfield, O., from an attack of heart trouble, as he was in the act of drinking a cup of coffee. Mr. Ahrendt, as general manager of the New Method Stove Company and delegate of his company to the A. G. A., had just returned from a trip to New York.

He was born in Chicago, Oct. 4, 1876. His boyhood and early manhood days were spent in the Lake City, and at the age of eighteen years he became associated with various stove companies in the capacity of salesman.

Mr. Ahrendt went to Mansfield in 1910 and became associated with H. H. Sanford in the management of the New Method Stove Company. For a number of years he was general manager and sales manager of the company in the manufacture of stoves. He was married to Miss Magdalena Lingler, of Hamilton, in 1918, who, with two sons, Robert and William, and one brother in Florida, with whom he was associated in fruit growing, survive. His mother died last September. Mr. Ahrendt was a member of 13 years' standing in the Mansfield lodge of Elks, and at the time of his death was chairman of its board of trustees.

George D. Roper

AS THIS ISSUE of the MONTHLY goes to press, word is received of the death of George D. Roper, president of the George D. Roper Corporation, Rockford, Ill. Further details will be given in the January number.

The Laboratory Issues Its Certificate of Approval

New Gas Range Specifications Are Ready and Additional Tubing Samples Are Passed

By R. M. CONNER, Director, Testing Laboratory

THE time has arrived when manufacturer and gas company members may look forward with interest to succeeding issues of our A. G. A. MONTHLY for a list of approved appliances. As this article goes to press (November 10th) we have tested and approved the following samples of flexible gas tubing:

LIST OF APPROVED FLEXIBLE GAS TUBING

Type	Manufactured by
3/8" Gaspruf Stove Tubing with "Eureka" Ferrules	Atlantic Tubing Co.
5/16" Gaspruf Stove Tubing with "Eureka" Ferrules	Atlantic Tubing Co.
5/16" "W" Gas Tubing with "Eureka" Ferrules	Atlantic Tubing Co.
5/16" Evertite Tubing with Eastman Aluminum Ferrules crimped on	Eastman Mfg. Co.
5/16" No. 324 Sta-Tite Flexible Gas Tubing with Sharder Ferrules	New York Gas Tubing Co.
5/32" Titeflex Flexible Tubing with "Shrader" Ferrules	Titeflex Metal Hose Co.
1/4" Titeflex Flexible Tubing with "Shrader" Ferrules	Titeflex Metal Hose Co.
5/16" Titeflex Flexible Tubing with "Shrader" Ferrules	Titeflex Metal Hose Co.

The city of Baltimore recently adopted an ordinance, effective October 7, 1925, which makes it unlawful for any dealer or manufacturer to sell, or offer for sale, any type of tubing which has not satisfactorily passed the American Gas Association's specifications. At the present writing the above types of tubing are the only ones that will be accepted there. This is one of the most progressive steps ever taken by any city in our country toward regulation of the sale and use of gas appliances, and Baltimore is to be congratulated on its progressiveness. This city was the first in the United States to use city gas; the adoption of such an ordinance is undoubtedly not a coincidence, but a further indication of their active interest in its proper use.

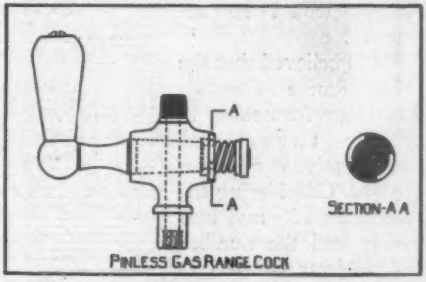


Fig. 1. Roberts' Pinless Gas Cock Approved by Laboratory for 1925 Specifications.

In order that the research work now being conducted in our Laboratory to assist the various appliance sub-committees might be further expedited, J. Corsiglia, who has been stationed at the Bureau of Standards for the past six months under E. R. Weaver's supervision, was transferred to our Cleveland force. While at the Bureau, Mr. Corsiglia assisted in the many appliance tests undertaken there and became expert in the use of the new thermal conductivity apparatus. His addition to our staff should prove a very valuable asset and assist us greatly in expediting the work we now have on hand.

On November 1st, the new printed gas range specifications were mailed to all manufacturer and gas company members for suggestions and criticism. The period allowed for the acceptance of comments was reduced by our Executive Board from three months to one month. This action was justified on the grounds that these standards are not wholly new, but similar in a great many respects to the ones with which most of us are familiar;

and second, that there is an urgent need for them in order that our Laboratory may begin the work of testing gas ranges in the very near future.

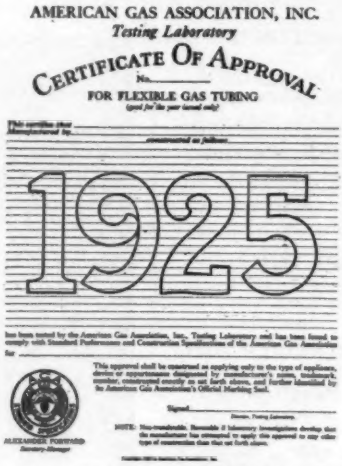
Therefore, December 5th was set as the last day on which comments would be accepted.

It is believed that the Gas Range Committee's performance in editing these new specifications sets a record. Considering the amount of revisions made and the number of subjects covered in their work, they are certainly to be congratulated on their progress.

All the appliance subcommittees met during the last month with the exception of the Central House-Heating Appliance Committee. As an example of the importance which is attached to this type of work, the cases of Mr. Masser of the Los Angeles Gas & Electric Company, and Messrs. C. R. Miller and E. L. Hall of the Portland Gas & Coke Company, who came from their respective stations in the West to Atlantic City to attend these committee meetings, are cited. It is very gratifying to note the amount of interest being displayed in the utilization end of our business.

During last month the General Specifications Committee approved the Roberts' Pinless Gas Cock as an acceptable alternative design for the standard stop pin cock shown in Exhibit D and E of the 1925 Gas Range Specifications. (Fig. 1.)

Policies governing the issuance of laboratory test reports were recently approved by the Laboratory Managing Committee at Atlantic City during our Annual Convention. This announcement should be of interest to all manufacturers who are likely to submit appliances for test. Briefly, the procedure adopted is quite similar to that followed by the Underwriters' Laboratories of Chicago. When a product has been submitted for test and is approved, the manufacturer will be given a certificate to this effect. (Fig. 2.)


AMERICAN GAS ASSOCIATION, INC.
Testing Laboratory

CERTIFICATE OF APPROVAL

No._____

FOR FLEXIBLE GAS TUBING

(good for the year named only)

1925

ALEXANDER FORWOOD
Secretary-Manager

Fig. 2. This Is the Laboratory's Diploma for Appliances and Equipment to All Who Pass Its Examinations

Further, Association members will be advised of this fact through our various publications. Manufacturers will not be given a detailed test report, as such a procedure would eventually lead to direct comparisons between approved types of products—a situation which the Association is particularly anxious to avoid. Publication of test results on competitive appliances would most assuredly react in general to the manufacturer's disadvantage.

Where an appliance has been disapproved, the Managing Committee feels that the manufacturer should be given the major portions of his appliance's test report, particularly such sections as refer to constructional imperfections.

Letters are being received daily from our gas company members pledging their support to the Laboratory and requesting lists of approved types of tubing for their guidance. Evidently our Laboratory is to become a most important factor in influencing the commercial aspect of our business. We have concrete evidence that it has, even at this early date, begun to raise the standards of construction of various types of appliances, indicating the manufacturer's desire to improve his product and the Association's active interest in adequately safeguarding all of our people.

Educational Advantages of Budgetary Control

Properly Used, It Is the Bulwark of a Company's Credit

By G. L. STANSBURY, Business Research Corporation

THE executive policy set forth in a budget can only expect cooperation in its execution when the line and staff have their part in formulating the policy. The responsibility for original budget estimates should be vested in the line and staff officers. The effect of these estimates on the balance sheet should be found and an unsatisfactory effect carefully and patiently explained to those responsible for the estimates. Budget adjustments necessary to a satisfactory financial showing should be decided upon with the assistance of those having responsibilities; thus is cooperation obtained in the execution of policies.

DEFINING LIMITS OF EXPENDITURES

Expenditures, in a budgetary sense, do not represent only cash outlay. They may represent in part the conversion of certain forms of active assets into forms less active and, therefore, of less balance sheet value; or, they may represent in part the amortization or depreciation of assets at rates defined by administrative or executive policy. From this it is evident that the definition of the limits within which expenditures are to be confined must take into consideration sound business policy, funds available and estimated to become available, balance sheet ratios, and effect upon the surplus.

The purpose of a budget to determine what and when funds will be required has more than one virtue; also, it is a consistent argument for the preparation of budget estimates and the definition of executive policy far in advance of expenditures.

It is no secret that frequent borrowings in small amounts to tide over unforeseen cash shortages are expensive and soon bring the borrower into disrepute with the sources of money supply. As a result, it becomes increasingly difficult to borrow, and reputation for business sagacity is lost. The necessity for frequent borrowings in small amounts robs the borrower of the opportunity to buy money at the most advantageous rates.

A sound budget, prepared in time, points out the low spots to come in cash resources and permits additional funds to be arranged for in an orderly and economical manner. Also, it provides a logical explanation to be given to the lender, whether that lender be a bank, an underwriter, or a prospective stockholder.

Just as the responsibility for budget estimates should be vested in the line and staff officers, so do the approved estimates become standards by which to judge the performance of those officers. This is, perhaps, one of the greatest educational features of a budget. By permitting frequent comparisons between estimated and actual performance, it provides the means by which the chief executive keeps in touch with all the elements of his business. When properly presented to the line and staff officers, these comparisons are distinctly instructive, stimulate interest and loyalty, and give these officers a far better view of their parts in the general scheme. No accounting or other purely after-the-fact plan can accomplish this result.

Under a sound budget procedure, the standards set up for accomplishment also become the basis for control. Comparisons between estimated and actual performance clearly point out when estimates must be adjusted, additional funds provided, or downward pressure on expenditures is necessary. Surely, no more helpful tool could be put at the service of the chief executive.

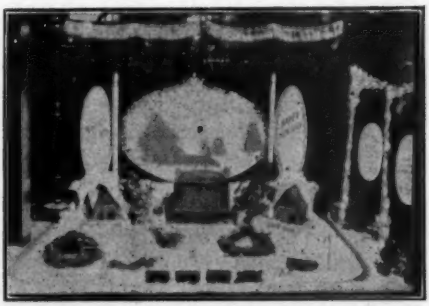
The general impression of budgetary control is that it is unalterably linked with accounting or statistics, which are, of necessity, after the fact. In modern methods of budgetary control, that control is accomplished long before accounting charges and the resulting statistics develop. This is of enormous advantage to administrative and executive officers as it accurately forecasts accounting results.

Budgetary control is purely an executive and not an accounting function. Its place is in the vanguard of activities and should not bring up the rear, else its advantages are lost.

Preliminary budget estimates assist the chief executive in the formulation of his policies. The broadcasting of such policies as may be given out cultivates a sense of individual responsibility among the business family.

The finally approved budget points the way to financial requirements and thus provides the vehicle for maintaining a satisfactory credit reputation. It furnishes the ground work for determining individual accomplishment and for controlling expenditures. In fine, it provides all the machinery for the complete executive understanding and control of a business. It is not a financial phantasmagoria but a perfectly simple picture of known facts and results to be reasonably hoped for.

IN SEASON AND OUT OF SEASON



The Gas Company at South Bend, Ind., Gives Its Customers Appropriate Greetings of the Day.

THE TIDE OF MEN AND AFFAIRS

AT A REGULAR MEETING of the board of directors of the Standard Gas Equipment Corporation, held in Baltimore, November 4, 1925, G. H. Warner having declined re-election, R. C. Hoffman, Jr., was elected president to succeed him. Mr. Warner was elected chairman of the board to succeed William M. Crane, who retires. George Vaughan succeeds Mr. Hoffman as treasurer and A. R. Hancock was elected assistant treasurer.

The officers and directors are as follows: President, R. C. Hoffman, Jr.; chairman of the board, G. H. Warner; vice-president in charge of sales, H. D. Schall; treasurer, Geo. Vaughan; secretary, T. C. Ratcliff. Directors: W. Graham Boyce, Union Trust Company of Maryland; William M. Crane, retired; Edmund S. Dickey, Maryland Meter Works; R. Curzon Hoffman, Jr., president; Norman James, President James Lumber Company, Baltimore; Henry H. Jenkins, Hambleton & Co., Baltimore; George H. Warner, chairman of the board.

ARTHUR H. RAND has assumed the office of president of the Minneapolis Gas Light Company, following his election at a special meeting of the board of directors. Mr. Rand, who for four years served as general manager of the corporation, succeeds the late A. T. Rand. Mr. Rand will retain the office of general manager, continuing as the chief operating official. He is a second cousin of the late Mr. Rand.

Rufus R. Rand, vice-president, and E. W. Brace, secretary-treaurer of the company, were re-elected by the directors.

JAMES M. BENNETT, publicity manager of the United Gas Improvement Company, has been appointed chairman of the Publicity Committee of the forthcoming Sesqui-Centennial Celebration in Philadelphia. The other members of the committee are the publicity directors for the other public utilities and large business houses in that city.

PAUL J. NUTTING, who recently resigned as manager of the Toledo branch of the Combustion Utilities Corporation, has become president and general manager of the Binney Castings Company of Toledo.

E. S. WILLEVER has succeeded W. W. Nielson as assistant general manager of the Springfield Gas and Electric Company, Springfield, Mo. Mr. Neilson becomes general manager of the Tucson Gas and Electric Light and Power Company, Tucson, Arizona.

ROBERT I. THOMPSON of the Carolina Power and Light Company has been made manager of the Gas Division, succeeding A. F. Kersting, resigned.

CHARLES B. MCKINNEY, formerly president of the Municipal Gas Company of Dallas, Texas, is now general manager of the Houston Pipeline Company of Houston.

HARRY BRUCE READING, formerly of the Brooklyn Union Gas Company, Brooklyn, N. Y., has entered the employ of the Consolidated Gas Company of New York.

GAS·PROGRESS

Issued under the Auspices of the Publicity and Advertising Section of the American Gas Association, 342 Madison Avenue, New York, N. Y.
F. L. Blanchard, *Chairman* C. W. Person, *Secretary* H. Obermeyer, *Editor*

Vol. I NOVEMBER 15, 1925 No. 1

INVESTMENT BANKER LAUDS MANAGEMENT OF GAS COMPANIES

Scheel Says Conservative Financing Assures Healthy Future Growth.

A healthy and stable condition of the manufactured gas industry is indicated by Fred H. Scheel, vice-president of the Utility Securities Company, in a report made public by the American Gas Association.

Mr. Scheel asserted that out of the ten million meters connected to the mains of the manufactured gas companies today, only 1,015 are involved in receivership. The meters so involved belong to two small companies with a combined capitalization of about $255,000 as compared with $4,000,000,000 invested in the manufactured gas industry as a whole.

"Nothing could demonstrate better the inherent soundness of this century-old public utility," Mr. Scheel declared. "Gas company securities," he said, "are daily growing in popularity as the investing public comes to realize that the remarkable expansion of the industry in the past few years has been accompanied by very conservative financing.

"In the past decade the output of the manufactured gas industry has doubled, and the demand for industrial gas has multiplied tenfold. A recent study of twelve leading American gas companies shows that in the past five years their gross income has increased 14.7 per cent and net income available for dividends 235 per cent.

"Yet capital invested in this group of twelve leading gas companies has increased only 20 per cent in this period. Here is an indication that the recent growth of the industry has been accomplished in large part by increased efficiency of operation and has not been attended by undue capitalization of earnings."

Gas-Fired Ice Called Cooling Agent of Future

Engineers in Special Report See Dream of Steinmetz Come True

Gas-fired domestic refrigeration on a commercial scale is now an accomplished fact, according to a report of a special committee of prominent engineers who have been investigating the subject for the American Gas Association.

As the result of its experiments, the committee states that domestic refrigeration by burning city gas not only is practicable, but that it is also the cheapest and only noiseless method yet discovered. The gas refrigerator differs from the electric in that the former is an absorption type of machine in which ammonia is absorbed into the water and then released, while the compression method is employed in the electric process.

F. W. Tyrell of Omaha, Nebraska, a member of the committee, said that the tests which were made justify the prediction of the late C. P. Steinmetz when he predicted that the future of household refrigeration would come in the gas-fired absorption unit.

"The advantage of the absorption process for household use," Mr. Tyrell reported, "lies in the fact that energy in the form of gas can be purchased much more cheaply than electrical energy, particularly when the electrical energy is purchased in such small blocks as the average householders use."

H. DeWitt Valentine, of Chicago, chairman of the committee, said:

"The data now presented is sufficient to lead us to believe that the time for artificial refrigeration and its development is at hand, and that the sooner the manufacturer, the gas company and the public will realize that the absorption type of machine, coupled with the use of manufactured gas, presents opportunities in a very interesting field, the better it will be for all concerned."

Mr. Valentine asserted that entire buildings would eventually be cooled by gas in the summertime.

Gas Utilities Urged To Meet Fuel Crisis

A warning to the more than 500 leading gas companies who are members of the American Gas Association to take precautions to guard against a possible fuel shortage has been issued by Alexander Forward, secretary-manager of the association.

"From the best information obtainable," Mr. Forward said, "it seems reasonably certain that most of our members are fully conscious of our duty to the public whom we serve and to ourselves of assuring an adequate supply of fuel to guarantee continuous service even in the event of a largely increased demand."

Mr. Forward stated his belief that for the most part the gas companies of the country were prepared for any development or contingency that might arise in the coal situation nationally.

NOVEMBER FOGS KILL HUNDREDS EACH YEAR

Do more people die in November? Sir Maurice Abbot Ande[illegible] a member of the [illegible]ke

This, the First Issue of "Gas Progress", Modestly Makes Its Bow to State Directors of Public Utility Information and Others Interested in News of the Gas Industry. There Is More Real News in the Gas Industry Today Than Ever Before in Its History, and It Is the Object of This Bulletin to Give Such News an Outlet. The Distribution of "Gas Progress" Is Strictly Limited and Reaches the Newspapers Only Through the State Committees Referred to. It Is, Therefore, Requested That Only Those Who Can Make Effective Use of the Bulletin Ask to Be Placed on the Editor's Mailing List.

Affiliated Association Activities

Wisconsin Utilities Association

The fourth annual convention of the accounting section of the Wisconsin Utilities Association was held in Madison, Wis., on October 23rd.

The chairman, L. H. Boutell, reviewed the accomplishments of the year, referring in particular to the work of each of the committees. A discussion on "Recent Developments in Machine Accounting" followed, during which Mr. Kohlhepp referred briefly to the development of statistical machines. He also informed those present that copies of the new standard form of annual report can be secured from James B. Walker, secretary of the National Association of Public Utility Commissioners, 270 Madison Avenue, New York City.

Robert H. Macke read a paper on "Third Stub System for Creditor's Accounts" and E. H. Fiedler presented a paper on "No Book System for Keeping Ledgers."

C. G. Blough, Public Utility Statistician of the Tax Commission, presented a paper entitled "How Public Utilities Are Assessed in Wisconsin." This was a very complete review of the taxing of utilities and it was listened to with unusual interest.

Other interesting papers and reports given were:

Report of Committee on Purchasing and Storeroom Accounting by L. C. Wellenstein, La Crosse; "The Reason Why Public Utility Accounting Differs from Industrial Accounting" by W. A. Toellner, Madison; "Accounting for Fixed Capital Retired with Special Reference to Pole Lines" by A. A. Cavanaugh, Eau Claire. Mr. Cavanaugh could not be present and his paper was read by L. N. Gobler. Other contributions were "Present Day Price Basis vs. Original Cost Basis" by Grant Chandler of Milwaukee and Chicago, and "Revised Classification of Accounts for Class C and D Electric Utilities" by H. H. Wilson, Railroad Commission of Wisconsin. L. E. Gettle, chairman of the Railroad Commission, gave the address at the banquet in the evening.

The officers of the section elected for the new year are: Chairman—D. T. Montgomery, of Eau Claire; Vice-Chairman, Frank R. Eckert, of Wausau.

Copies of any of the papers read at the convention may be obtained from J. N. Cadby, executive secretary, Wisconsin Utilities Association, Madison, Wis.

COMMERCIAL SECTION

In calling to order the meeting of the Commercial Section of this Association held in Madison, Wis., on November 12 and 13, Chairman W. R. Lacey urged support of the national sales plan of the American Gas Association.

G. C. Carnahan, of Chicago, described his company's experience with gas-fired house heating. Albert A. Schuetz of Milwaukee gave an illustrated talk showing the industrial applications of gas. Mrs. Katherine Delaney of the Wisconsin Public Service Corporation, Green Bay, gave a demonstration of how the home service worker addresses her audiences.

Don E. Mowry, secretary of the Madison Association of Commerce, said that gas and electric companies should not sell merchandise that does not use gas or electricity except by common agreement with the merchants of the community or in cases of self defense.

The officers elected are D. M. Williams, Madison, of the Wisconsin Power and Light Company, and M. S. Bandoli, vice-chairman, Eau Claire, Northern States Power Company.

Pennsylvania Gas Association

The mid-year meeting of this association is to be held at the Hotel Casey, Scranton, Pa., on Monday, December 7, at 10 a.m. The following papers will be presented at the opening session: "Home Economics", Miss Marian Brainard; "Survey of Text Books on Economics and Civics in the Pennsylvania Public Schools", Major J. S. S. Richardson; "House Heating with the Doherty Gas-Oil Burner" by a representative of Combustion Utilities Corporation.

The Scranton Gas Company has invited the members and friends of the association to be its guests for luncheon at which addresses will be delivered by Mayor Durkan of Scranton, W. A. Allison of the Pennsylvania Public Service Commission, and the Rt. Rev. Samuel Steinmetz. The luncheon will be followed by round table discussions of the subjects: "Common Use of Ditch by Water and Gas Pipes", "Tar Disposal by Small Plants", "Bookkeeping Without Books", and "Method of Training and Compensating Salesmen in Small Companies." The officers of the Pennsylvania Gas Association are: President, W. G. Murfit; 1st Vice-President, R. C. Cornish; 2nd Vice-President, Joseph Jeffrey; Secretary-Treasurer, Geo. L. Cullen.

Canadian Gas Association

At an executive committee meeting of the Canadian Gas Association held at Atlantic City, October 15, 1925; it was decided to hold the next convention of that association in Montreal, Quebec, Canada, Thursday and Friday, July 8 and 9, 1926.

It is altogether likely that a boat trip to the convention, via Lake Ontario, Thousand Islands and Rapids of the St. Lawrence River, will be arranged for the benefit of all who want to make the Canadian convention a vacation trip. Over 80 delegates availed themselves of this excellent side feature during the meeting held in Quebec City this past year.

Future Fuel for Gas Making on the Pacific Coast

Has the Time Come for Oil to Give Way to Coal?

By W. S. YARD, Pacific Gas and Electric Company

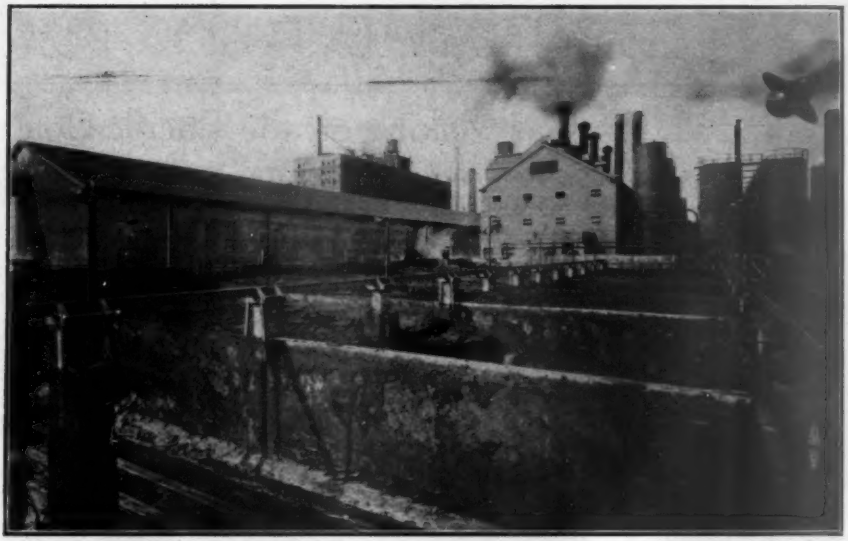
W. S. Yard

SINCE this subject was discussed at the Portland meeting of the Pacific Coast Gas Association in 1920, considerable research and development work have been carried on, with a fair measure of success, for the improvement of existing oil gas processes and also for the development of possible new oil gas processes. We have not kept pace with the very rapid improvements in the distillation and cracking of oil as practiced by the oil refineries. This advance in oil refining practice has nullified any improvements made in the oil gas manufacturing processes which are due to the lower B.t.u. value oil now being supplied for our use in gas-making purposes.

In addition to the higher price of oil, we are also facing a lower quality product for our gas production due to the ever increasing demands for motor fuel. It is realized that this situation is an economic condition which can not be easily changed and that any improvements in the present oil-gas processes or development of a new gas process dependent entirely upon oil for fuel will only delay the time when it will be necessary to change to coal for our fuel. The gas companies of California, through the California Gas Research Council, in collaboration with the United States Bureau of Mines, have laid out an extensive program and are now actively at work studying the various coals available to the Pacific Coast as a future fuel for gas-making purposes.

The problem is more or less of a local nature and must be worked out by each

SCENES AT THE PORTRERO PLANT OF THE PACIFIC GAS & ELECTRIC COMPANY
Left, Filtering Installation for Clarifying Wash Water Before Discharge to Bay. Right, 5,000,000 Cubic Foot Oil-Gas Generator under Construction.



LAMP BLACK SEPARATORS OF PORTRERO OIL-GAS PLANT
The Lamp Black Produced in Oil Gas Production Furnishes Fuel Required for Steam Raising.

company studying the fuel supply available and the process which will render the consumer the best service at lowest cost. A decision on this subject is of general interest, but it will not apply to all companies represented by the Pacific Coast Gas Association due to the large variety of fuels available and local conditions which are of vital importance.

In the Northwest, coal is being used in several different processes. Victoria and Vancouver report very good results from the use of sawdust mixed with coal in continuous vertical retorts. Undoubtedly other processes will be perfected for the use of sawdust and waste lumber material as gas-making fuels for the Northwest. Several carburetted water gas plants are showing good results using sub-bituminous coal as generator fuel. At Portland, oil gas is produced and the manufacture of by-products, namely, motor fuel and briquettes, helps to reduce the cost of gas.

In central and Northern California, oil gas is produced and no by-products sold, so that here the future fuel supply is of vital importance. In Los Angeles and adjacent territory, the gas supply is mainly natural gas and reformed gas. From present information they have ample reserves for a number of years. San Diego manufactures oil gas, and thus we have in the Pacific Coast section practically every variety of gas manufacturing processes using coal or oil.

The future fuel for gas making is a most important subject to the manufacturers of oil gas on account of the very rapid increase in demands for gas supplied by these companies. The large increase in gas consumption owing to heating and other new uses has made necessary a continuous construction program for the increase of generating and distribution capacities.

The gas industry is growing at a very rapid rate and will continue to increase at a faster rate if we can solve our problems and render good efficient service at lower costs per B.t.u. Oil is being used for fuel in many industries and homes, and at some later date these oil consumers will be demanding gas service provided we can reduce our costs by utilization of other fuels for gas production. A consumer once accustomed to the conven-

ience of gas or oil will never revert to the use of solid fuel provided gas is available at a reasonable cost. Most domestic users of oil will eventually become gas consumers in the event oil becomes too high priced in relation to gas.

The oil production of California has increased tremendously in the past few years, the consumption of gasoline is constantly on the increase, and the increased use of the Diesel engine is creating a greater demand for Diesel oil. The future trend of the oil refinery business will no doubt be towards improved distillation methods and a greater use of cracking processes, giving a larger yield of gasoline and Diesel oil to offset the expected reduction in crude oil production.

The oil reserves of California are estimated to be in excess of one and one half billion barrels not including the possible oil yield from the enormous shale oil deposits. Shale oil may be a very important factor in future gas production, as samples of this oil obtained from a commercial plant operating in Southern California appear to be an excellent oil for carburetting water gas.

This much is certain, however, that the present known oil resources of California can be depleted in a comparatively short time if the ever-increasing rate of production and consumption is continued. On the other hand, the estimated coal reserves available to the Pacific Coast are almost inexhaustible, two hundred and eighty-three billion tons being the amount estimated by the United States Geological Survey in Utah, Washington, New Mexico, California and Oregon. The Utah coals are high grade. Washington has approximately eleven billion tons of good bituminous coal and the remainder available to the Pacific Coast are mainly sub-bituminous, high volatile and high ash coals.

In discussing the possible future, it is well to draw attention to the fact that this section consumes but a small quantity of coke and it probably would be difficult to develop a market for domestic coke in large quantities. With this thought in mind, the trend of gas manufacturing development will be along the lines of complete gasification using a minimum of oil for enriching and eventually the complete elimination of oil for gas production purposes.

Control Valves and Gauge Board on Operating Floor of Portrero Plant.

The use of local sub-bituminous coals for gas production offers many problems which can be solved; the successful use of these fuels in water gas sets in the Northwest offers one solution. The sub-bituminous coals in California yield large amounts of high gravity oil when distilled at low temperature, and the coke or charcoal remaining after distillation could be used in water gas sets.

A very large deposit of sub-bituminous coal has recently been discovered in Northern California so that this State has a fuel supply ample for gas manufacturing purposes for a great many years provided some economical methods of utilization can be devised. As far as the future fuel for gas-making purposes is concerned, there are enormous coal reserves available to the Pacific Coast gas companies and it is only a question of time until these fuels will be used for gas production.

Coal Problem is Solved By Transportation System

COAL strikes have fewer terrors for the domestic consumers than they used to have before gas house-heating became an accomplished fact, but they are still serious enough for the gas company with a coal gas plant.

It is interesting to note that the Springfield Gas Light Company have taken steps at least to safeguard the transportation of coal to their plant, and have recently persuaded

The "Pioneer", Towboat of the Springfield Gas Light Company, Dredging for Pipeline under Connecticut River at Agawam, Mass.

United States Army engineers to recommend an expenditure sufficient to dredge the Connecticut River between Windsor Locks and Hartford, a stretch of ten miles, to the depth of six feet, provided private interests will raise one-half the cost.

W. H. Bradley, manager of the Springfield Company, has written us the following brief account of his transportation problem and attempts to solve it:

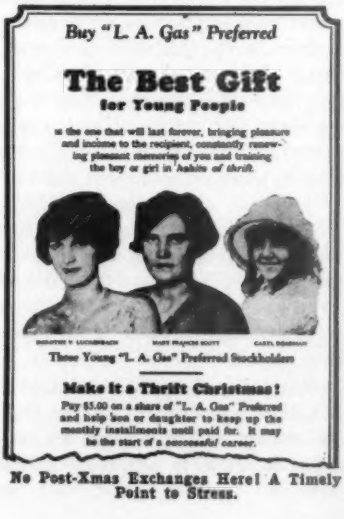
"The Springfield Gas Light Company first took an active interest in navigation on the Connecticut River in the summer of 1907, when it sent a small barge to Hartford and brought up some sixty tons of coal to Springfield. The object was to see if the transporting of coal on the river between Hartford and Springfield was feasible, particularly as a little time previous to this we had had difficulty in getting in our supply of coal, because of scarcity of cars.

"Following this experiment, the Springfield Navigation Company was organized the following year by Colonel Charles H. Tenney, president of the Springfield Gas Light Company, which brought out a dredge and towboat named Pioneer, and during 1909 the Springfield Navigation Company spent considerable time in improving and dredging the river between Windsor Locks and Hartford. The Navigation Company bought two Erie canal boats, shortened them so they would go through the locks, and with this equipment brought up two barge loads of coal from New York City. The cost of bringing up this coal was greater than the freight rate, due to the fact that the water was very low and the river not sufficiently dredged.

"Ever since that time, the Springfield Navigation Company has endeavored to interest the Federal Government to appropriate sufficient money to dredge out the river and make it feasible to bring up such boats as could go through the Windsor Locks Canal, viz. 78 feet in length, 18 feet beam, and 5½ foot drive. A boat of this size will carry about 200 tons of coal.

"Following the recommendations of United States Army engineers, the Springfield Chamber of Commerce is now engaged in endeavoring to secure a guarantee from interests along the river to cover one-half the cost. If the Chamber is successful in this work, the dredging will be done, after which we expect to be able to bring up coal by water at a profit for the Springfield Navigation Company, and a saving in freight rates for the Springfield Gas Light Company and others who will use navigation for shipments."

They Knew What *They* Wanted


Buy "L. A. Gas" Preferred
The Best Gift
for Young People
is the one that will last forever, bringing pleasure and income to the recipient, constantly renewing pleasant memories of you and training the boy or girl in habits of thrift.
Three Young "L. A. Gas" Preferred Stockholders
Make It a Thrift Christmas!
Pay $5.00 on a share of "L. A. Gas" Preferred and help son or daughter to keep up the monthly installments until paid for. It may be the start of a successful career.

No Post-Xmas Exchanges Here! A Timely Point to Stress.

ACCOUNTING SECTION
DEWITT CLINTON, Chairman ALBERT L. TOSSELL, Vice-Chairman
H. W. HARTMAN, Secretary

Evolutionary Development of the Statistician

Once Humble "Bookkeeper" Now Wields Power with the Engineer

By H. C. DAVIDSON, Consolidated Gas Company of New York

H. C. Davidson

BEFORE considering the program of the year, it is appropriate to pause long enough to take inventory of the present development of the accountant, and to recognize clearly the place he has come to fill in the present-day organization of the industry.

The early days of the gas industry found each organization "paddling its own canoe" with little knowledge of the activities of others; in fact with little interest in these activities, unless the pinch of competition or some other special reason necessitated attention to its neighbors.

The "accountant" was then unknown. Instead, the familiar figure of the "bookkeeper" formed a part of the inner workings of the company. He was considered one of the necessary evils of the business, and might be found off in some undesirable corner of the office leaning over a sloping desk; his pen in hand, a vizor shade on his brow, laboriously engaged in recording entries, the significance of which he was neither permitted nor expected to understand. He was probably believed to be personally responsible for most of the unpleasant aspects of the accounts he recorded, and to be the chief cause of the failure to make larger profits.

His emancipation from that downtrodden existence found its inception primarily in the demand of the industry for the greater scope of his services. From this humble beginning have sprung the accountant and statistician of today, standing as experts in the affairs of the company.

The development of public utility regulation has added greatly to the importance of the books of account, and therefore to the responsibility of the accounting officers. The industry has progressed from the period when small companies struggled independently to make what they could, at rates based upon what the market would bear, to the present day viewpoint of public stewardship—recognizing gas service as one of the necessities of modern life. In this evolution the books of account have passed from the category of private property to essentially public records, and the accountant and statistician have emerged from the obscure duties of mechanical historian to the larger field of participating in the determination of company policies. He must be the source of much of the data upon which the engineer or executive bases his judgment. Therefore, he must be capable of passing judgment himself upon his accounting results in the making, and must know that the conclusions deducible from his figures are sound.

A better general understanding of the engineering and other operations of the company has, therefore, become an essential part of his work. So the accountant and the engineer, traditionally friendly enemies, have in recent years virtually entered into a partnership toward the common purpose of greater efficiency.

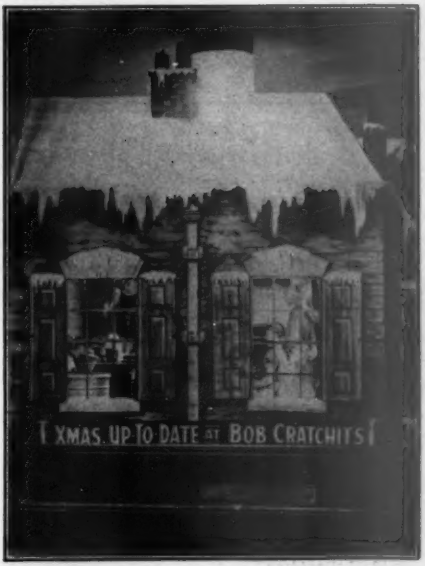
With the realization of the common problems of the industry and the benefits accruing from the interchange of ideas came the impetus to collective study and effort. This is reflected today in the far reaching national activities of the American Gas Association and its many affiliated organizations.

Thus accountants and statisticians find themselves an important part of a larger movement of national scope in the study of the requirements and developments of the industry. Each department of the business is contributing its portion, as a unit of a great organization, toward combined accomplishments, far beyond the possible attainment of individual effort.

Some Xmas Windows From Over the Sea

OUR illustrations show the ingenuity which has been displayed by English gas companies, particularly the Luton Gas Company, in their efforts to provide attractive displays during the Christmas shopping season.

The Scrooge-Up-to-Date scene depicts an ordinary living room, suitably furnished, and complete with a gas fire so arranged as to appear lighted. The figure of Scrooge is seen sitting before the fire, enjoying the glowing warmth. The spirits are in silhouette, and appear at intervals at the two windows, above which are large showcards giving the names of the visiting spirits—gas for comfort and economy representing the ghosts of "Christmas Present" and "Christmas Yet to Come."



Special Christmas Display of the York Gas Company, York, England.

In a Country Where Dickens Is Universally Known and Loved, Such a Window, in Luton, Bedfordshire, Makes a Peculiarly Winning Appeal. America, However, Also Knows Its Dickens.

Past, Present and Future of Gas Advertising

Campaigns to Come Will Be on Greater Scale Than Ever

By J. CHARLES JORDAN, Pacific Gas and Electric Company

J. Charles Jordan

WHEN we consider the growth and development of our great gas and electric utilities, when we look through the columns of the newspapers for years back, we become impressed with the growth of the publications, the business represented in the columns, many of which have been consistent advertisers for well over half of a century.

Advertising made possible the newspaper's growth and aided materially in the growth of the business advertised.

For the purpose of ascertaining the part that my company has played in this progressive movement, I recently ran through the files of the Oakland Tribune from 1874 to date and found that, ever since the beginning, this company through its predecessors has been a constant advertiser.

The Oakland Gas Light Company, organized in 1866, was one of the group that afterward made up the Pacific Gas and Electric Company. Gas was made from coal and, having a surplus supply of coke on hand, the company began during its first years of operation to advertise for the sale of coke. In 1874, we find running regularly a 1 column, 2-inch advertisement:

THE CHEAPEST FUEL COKE
75¢ A BARREL
AT THE GAS COMPANY OFFICE

February, 1876, we find an advertisement:

OAKLAND WILL BE THE MOST CHEAPLY LIGHTED CITY IN THE UNION

The principal advertising in connection with early days was the announcement of the reduction of rates, which came at frequent intervals, and it is interesting to note the reasons for the reductions. Gas first sold at $7.50 per 1000.

July, 1877:

REDUCTION IN GAS
Important to landlords and gas consumers

In July, they announced that on the following October, gas would be reduced to $4.00. Reason for: First, a daily saving in the cost of one of the necessities of life. Second, a decrease in the number of fires caused by the use of the dangerous distillates of petroleum. Third, a saving in human life by substituting stationary lights for this most brittle of lamps. The most convenient and safest light brought within the means of the most economical household.

January, 1878:

FURTHER REDUCTION IN GAS

October 1, 1877, the price of gas was reduced to $4.00 per thousand feet. The Oakland Gas Light Company, in accordance with the policy which has governed it since its organization to reduce the price of gas as rapidly as the consumption will justify, hereby gives notice that from and after the first day of October next the price will be reduced to $3.75 per 1000. The large addition now being made to the works of the company, and the adoption of all recent improvements will

enable it to carry out its purpose at all times to furnish gas at rates, which, considering the value of coal and labor, will make Oakland the most cheaply lighted city in the U. S.

FURTHER REDUCTIONS

October 21, 1878, directors of the Oakland Gas Light Company met and resolved to reduce the price of gas to $3.50 per thousand on January 1, 1879.

This was a 1 column 3-inch display. Some copy ran for 6 months, E. O. D.

November, 1883: The first cooking school ads were run, the charge was $5.00 for 6 lessons or $1.50 per lesson. Wednesday's lessons were $2.00, and it was announced that there would be no lessons on Saturday or Thanksgiving Day.

The lessons were given through:

THE OAKLAND COOKING SCHOOL
ASSOCIATION
SECOND ADVENT CHURCH

No mention was made of this being a gas school.

In the same issue was a 1 column, 3-inch ad, being the first gas range ad to be published in Oakland, which was as follows:

GAS STOVES
NO SOOT—ECONOMY—NO ASHES
COOKING AND HEATING STOVES
FOR SALE AND TO RENT
WILL BOIL, BAKE AND BROIL
CHEAPEST FUEL—CHEAPEST FUEL
Apply at Gas Company Office
9th & Washington Streets

Directly under the ad was:

COKE
.. THE CHEAPEST FUEL
SEND YOUR ORDER
TO THE GAS COMPANY OFFICE
ONLY 75¢ PER BARREL

In November, 1886, we find an advertisement:

GAS COOKING STOVES
ARE ECONOMICAL
COOKING STOVES FOR SALE AND RENT
HEATING STOVES OF NEWEST PATTERNS
CHEAPER THAN COAL
200 IN USE
Special terms to gas consumers
No smoke No dust

About this time the increase in number of coal dealer ads are very noticeable. In November, 1888, they were running the same selling point, 200 in use, but added: Call and see them at the office.

Along about 1900, considerable improvement is shown in the make-up and type of advertising. The Pacific Gas and Electric Company was organized in 1905, just 20 years ago, and at that time each of the divisions were handling their own advertising. February, 1910, the company created a publicity department to handle the magazine and other advertising matter. Under this plan the head office publicity department handled all the advertising except the Alameda Counties Districts advertising. During these later years the company was growing very rapidly and the advertising was becoming of greater value. In 1920, it was decided to consolidate all the company's advertising under the direction and supervision of an advertising agency. This plan was carried out for two years. It was readily seen that greater efficiency and many other desired advantages were to be obtained by having this work done within the company's own organization.

In 1922, the company, through its publicity department, took over the preparing and placing of all advertising. This company maintains a policy of dealer cooperation. The company does not sell gas appliances direct, but lends every effort to aid the local dealers.

Our advertising today is prepared with care and is so written as to divert trade to the dealer's store. All of our sales advertising carries a line, "See your local dealer."

Under our present plan we advertise in all the daily and weekly papers in the territory served.

Our institutional advertisements are written with the idea of aiding the customers and advising as to the correct ways of using and the many conveniences of gas. They are educational in character.

In order that the dealer may secure a tie-in and further benefit from our sales

advertisements we have them reproduced in jumbo size for display in stores and windows.

Our news bureau issues a regular weekly release of gas activities in the various cities and towns served. Office windows are turned over to the dealers and regular gas appliance displays are made therein.

The gas business has progressed rapidly during the past few years and indications are that we are about to experience, through new ideas and usage, a very healthy expansion. Advertising will play an important part. National campaigns through the American Gas Association, manufacturers and banking interests, will tell the story of gas through national mediums.

This will be tied-in with campaigns by sectional associations and will tell of the values in the local territories. Gas companies and dealers will use more space for advertising gas appliances and equipment to the end that there will be a concentrated drive and campaign that will bring for the gas industry an unprecedented growth.

Politicians Robbed of Foothold

ADVERTISING that is done by public utilities seems to be worrying politicians here, there and everywhere. Sporadic attempts to prevent public utilities from using advertising have been made off and on by politicians for years past.

There is a reason behind this latest move of the politician against the public utility and one that public utilities should not leave unexplained. So far, we have observed only one company that has made a real reply to this growing attack of politicians on the advertising of public utilities. That reply comes from the Puget Sound Power & Light Company. It was made by Norwood W. Brockett, public relations director of the company, in an address before the convention of the Pacific Coast Advertising Clubs Association.

From Printers' Ink.

"When a candidate was unable to obtain votes by reason of his own unfitness for an office," said Mr. Brockett, "he was always assured of a certain support by launching a malicious attack upon any of the public utilities in his district. Following the belief that we were to be judged by what we really did, and not by what some self-seeking individual said about us, we complacently permitted these attacks to go unchallenged and unanswered and neglected to place the truth before the people.

"We have now learned, however, that we must not only give good service at reasonable rates, but that we must also tell the people we are doing it and publicly disprove the unwarranted attacks made upon us.

"Those utilities which adopted this policy immediately met the full fury of those demagogues whose chief stock in trade was the vilification of the utilities. They resented having their statements challenged and disproved, and realized that their power would be broken when the truth about the utilities became generally known. In self-defense, they immediately termed all such efforts by the utilities 'propaganda' and glibly talked of 'millions' being spent by the utilities in an effort to deceive and mislead the people."

There's the reason. Advertising is preventing the politician from using the public utility as a ladder to public office. All of which sorely grieves the "cheap" politicians. For the public utility the only answer to this situation is: More and better advertising to the public and an explanation of the motives of the cheap politician in opposing such advertising whenever he attacks it.

THE POWER OF THE SPECIFIC

LAST WEEK IN CHICAGO, says "Odds Bodkins" in *Advertising and Selling Fortnightly*, I paused to jot down this copy from an outdoor painted sign on Michigan Avenue, on which a red brick house of substantial portions was pictured:

> $222.14 was the cost of heating this home with GAS last WINTER. Ask us what it would cost to heat your home with gas.
> The Peoples Gas Light & Coke Co.

I wonder how many thousand other men who never gave a thought to heating their homes with gas will bump into the $222.14 and begin to figure out how much their last winter's coal cost, as I did. By the time I had reached the bridge, I discovered that I had given myself quite a complete canvass on the advantages of heating a home with gas. Such is the power of the specific!

Company Seals for Trucks

By EDWARD H. BAUER,
Worcester Gas Light Co.

THE seal above was designed for the Worcester Gas Light Company for use on trucks and other advertising placards. The company has never had a seal before, and therefore we must consider this as the first attempt. These look very well on the doors of all of our machines. You will also note that, instead of the American Gas Association slogan being used around the edge of the seal, we have brought out the four "Cs", Comfort, Convenience, Cleanliness and Control, all of which are obtained through the use of gas.

On the holder there is a modified A. G. A. slogan. This slogan was modified in order to get it in on the holder. It is obvious that if we use the A. G. A. slogan, it will lose its effect on the holder on account of it being so long that it would require small letters. The lettering on the holder shown in this seal is in the correct proportion, and the words "gas" and "best", being the largest, bring out the point which we know is about correct. GAS is the BEST.

For the information of other companies who may be working for something along the same line, this seal is made in the form of a transfer. They cost us about $2.00 each in lots of 100. They are made by the Palm-Fechteler Company, 107 Summer Street, Boston, Mass. The seals come to us on paper. The body of the machine is first given a light coat of varnish, and then, as the varnish becomes tacky or sticky, that is, just before it gets dry, the transfer is applied to the varnish. It is rubbed smooth either with a squilgee or by hand in order to force out any air bubbles. It is then left to dry a few minutes, after which it is wet with a sponge and the paper is removed. This leaves the transfer as you see it, and it is just given a light coat of varnish over the face of it. This is to preserve the work.

We also have our slogan, "If It's Done With Heat, Gas Does It Best", made in this transfer. The sign is about 8" X 30". These cost us about $1.50 apiece. They are made in gold letters with black shading on a gray background. We find that this method of lettering our trucks costs us a great deal less than a paint job, and they are much more uniform than the jobs obtained by hand lettering.

PUT SEAL ON RANGES YOU SELL

SPEAKING OF SEALS, the above seal is put on each and every range installed by the Philadelphia Suburban Gas and Electric Company, Chester, Pa.

Such a seal at once establishes confidence. It tells the tenant or prospective buyer of an apartment or house that the range has been approved and installed by the gas company.

It serves much the same purpose as the *Good Housekeeping* Seal of approval, except that it furnishes a definite local tie-up.

"BOTH ENDS AGAINST THE MIDDLE" SOMETIMES WINS

TELLING THE PEOPLE in one part of the newspaper to do a thing and then in another part not to do it, would seem more or less suicidal; but apparently in Portland, Oregon, this went over all right. The Portland Gas & Coke Company, in its campaign to heat the homes in the City of Roses with gas, had to decry the nuisance of stoking a furnace. In this they were successful, but the more gas furnaces or hot water installations they sold, the more oil they used to make gas from, and therefore the more carbon briquets they turned out.

It therefore became necessary to advertise solid-fuel, with the result that in many of the papers one would find one ad urging people to buy solid-fuel and in another ad advising people not to use solid-fuel, but to use gas. Strange as it may seem to the casual observer, both campaigns were successful.

MANUFACTURERS SECTION
WATSON E. DERWENT, Chairman W. E. STEINWEDELL, Vice-Chairman
C. W. BERGHORN, Secretary

Servicing Domestic Appliances

Routing and Contract Systems Aid Customers and Bring in Revenue

By GEORGE L. MEYERS, Portland Gas and Coke Company, Portland, Oregon

OF all the modern gas appliances which have been devised, the instantaneous and automatic water heaters rank among the greatest from a convenience standpoint.

In order that the customer might receive dependable service and efficient operation from these heaters, the Portland Gas and Coke Company of Oregon some time ago inaugurated a periodical maintenance service, undertaking to clean and regulate the appliances once every month at a cost of 65 cents to the customer, or every two months at a charge of 75 cents.

This policy has developed into one of the most indispensable features of the service divison. At the present time 490 automatic water heaters are listed for regular maintenance and the business shows a steady growth.

In accordance with the agreement made with the customers, the two service men shown in the picture call around monthly or bi-monthly, as the case may be, to clean the heaters. Their first operation is to see that the vent carries away all the products of combustion; to see that the vent pipe is in good condition; to clean the coil thoroughly with a wire brush; to examine the baffle plates; to remove the burner and clean inside of the heater and burner ring with a wire brush; to open valve "B" wide to determine that the pilot piping and fittings are perfectly clear; to adjust the pilot flame; to take burner apart; to clean gauzes thoroughly; to remove drip pan and clean up dust and iron scales; to paint the heater in those parts showing oxidization; to take the temperature of the water, the consumption of gas per hour, the pressure of gas at the burner ring; to see that the orifice through which the gas is supplied is of standard size; to examine the condition of the burner, coils, water valve, gas valve, shell, door, base, condensation ring, burner ring and other parts. If any are in bad condition, a signed charge order is secured from the customer to replace.

A Crew of Two That Keeps the Home Waters Hot.

When the heater has been placed in a satisfactory condition the customer is requested to sign the maintenance sheet.

Necessary supervision is maintained for the operation of the maintenance work. Every heater which is accessible is cleaned each month in accordance with contract when the call is due. The number of cleanings is recorded by route sheets.

OUR NEW MEMBERS

GAS COMPANIES

Northwestern Utilities, Ltd., Edmonton, Alberta, Canada.

MANUFACTURERS

Caldwell Process Buffalo Corp., Buffalo, N. Y.

Paraffine Companies, Inc., The, San Francisco, Calif.

Marshall Furnace Co., Marshall, Mich.

Grand Rapids Water Heater Co., Grand Rapids, Mich.

Leystone Coal & Coke Co., Philadelphia, Pa.

ACTIVE MEMBERS

Standish, Gerald, Bronx Gas & Electric Co., New York, N. Y.

Reimer, A. F., Central Union Gas Co., New York, N. Y.

Carson, Harry Y., Birmingham, Ala.

DeBro, Theo. E., City of Sea Isle City, Sea Isle City, N. J.

Buckwalter, Joseph A., Buckwalter Stove Co., Royersford, Pa.

Dean, Joseph F., Sovik, Robert A., Beal, Thaddeus R., Mason, Earl Ross, Daniels, Henry, Rose, Edward C., Hannan, Joseph L., Central Hudson Gas & Electric Co., Poughkeepsie, N. Y.

Jorgenson, George, Wisconsin Public Service Corp., Green Bay, Wisc.

Siegmund, Harry L., Loustalot, Mathew L., Robinson, Harry G., Dunn, James William, Consolvo, Douglas C., Ritter, Frand Howard, Reynolds, William J., Turi, Frank, Lynn, Frederick W., Elbright, Emil, Zuidema, Albert, Public Service Electric & Gas Co., Newark, N. J.

Seidel, Wilbur R., Ross, J. Gordon, Kruger, Richard E., Rochester Gas & Electric Corp., Rochester, N. Y.

Lawton, William Jr., Milton, Marshall M., City Gas Co., Richmond, Va.

LaRow, Leo E., Edmunds, Robert C., Utica Gas & Electric Co., Utica, N. Y.

Banks, Andrew, Young, Louis, Consolidated Gas, Electric Light & Power Co., Baltimore, Md.

Grow, Fay, Nicolaus, Fred G., Reliable Stove Co., Cleveland, Ohio.

Manker, Forrest W., The Surface Combustion Co., New York, N. Y.

Burtt, Everett J., Hodenpyl Hardy Co., Jackson, Mich.

Caswell, Wallace B., Brockton Gas Light Co., Brockton, Mass.

Price, Douglas W., The Koppers Co., Pittsburgh, Pa.

Treichel, Henry G., Community Power & Light Co., St. Louis, Mo.

Laughton, Abbott A., Athol Gas & Electric Co., Athol, Mass.

Olson, Fred E., Grand Rapids Gas Light Co., Grand Rapids, Mich.

Bland, Clyde A., Des Moines Gas Co., Des Moines, Iowa.

Harding, Louis, Central Traction & Lighting Bureau, New York, N. Y.

Harvey, Cecil G. (Mrs.), Ogden, Kenneth Charles, Westchester Lighting Co., Yonkers, N. Y.

Peat, Arthur E., Grow, Charles Melville, Protheror, Thomas J., So. California Gas Co., Los Angeles, Calif.

Royal, Osmon, Caldwell Process Buffalo Corp., Buffalo, N. Y.

Cowan, James Jones, H. L. Doherty & Co., New York, N. Y.

Ingwall, F. F., Binghamton Gas Works, Binghamton, N. Y.

Steep, James B., James B. Steep Consulting Engrs., Indianapolis, Ind.

Osterhoudt, J. P., Standard Gas Equipment Corp., Baltimore, Md.

Mettler, Lee B., Lee B. Mettler Co., Los Angeles, Calif.

Grace, William A., Perth Amboy Gas Light Co., Perth Amboy, N. J.

Lane, Jessie B., Adirondack Power & Light Corp., Schenectady, N. Y.

Garvin, James F., B. F. Sturtevant Co., Boston, Mass.

Ferguson, Clarence W., Butterworth, Russell I., Bristol Gas & Electric Co., Bristol, Tenn.

Henderson, Chas. F., Shinholser, Wilbur Thomas, The Toledo Edison Co., Toledo, Ohio.

Garrett, Julian, Yorth, C. J., Northwestern Utilities, Ltd., Edmonton, Alberta, Canada.

Pier, Harry M., Research Corp., Chicago, Ill.

Ryan, William P., Ward, John T., Mass. Institute Technology, Cambridge, Mass.

Armel, N., Nubian Paint & Varnish Co., Chicago, Ill.

Holtz, W. H., Harris, George S., The East Ohio Gas Co., Cleveland, Ohio.

McAllister, J. E., Murphy, George R., Bovee, L. E., C. L. Bryant Corp., Cleveland, Ohio.

Melrose, Charles J., City Light & Traction Co., Sedalia, Mo.

Dickey, James M., Pacific Gas & Electric Co., San Francisco, Calif.

Cleland, Hance H., Spokane Gas & Fuel Co., Spokane, Wash.

Wade, L. W., Central Iowa Power & Light Co., Humboldt, Iowa.

Hill, Frank L., Laclede Securities Co., Chicago, Ill.

Fansler, P. E., Heating & Ventilating Magazine, New York, N. Y.

Bradshaw, Alexander Edward, The Metropolitan Gas Co., Melbourne, Australia.

Shears, G. R., St. Johns Gas Light Co., St. Johns, Newfoundland.

Ludwig, B., Munich Gas Works, Munich, Germany.

Showing Them How It's Done With Gas

Featuring the Industrial Exhibit Brings in the Curious and Several Others

By R. J. PHELON, Worcester Gas Light Company

SOME of the larger gas companies are fortunate in having space in their office building for a permanent display of industrial appliances and do maintain such a display with the various appliances connected and ready for demonstration.

In the Worcester office, however, floor space is at a premium, and the best we can do is to have a small showing of appliances in a basement show room, which is very seldom visited by our customers unless they happen to be in search of some particular industrial appliance.

It might be said that the general public has had very little chance to get acquainted with the industrial possibilities of gas, and it was this fact and the desire to educate the public as to the industrial uses of gas, as well as to advertise it to those directly concerned with the industrial use of the fuel, that led the Worcester Gas Light Company to stage an industrial exhibit last spring.

As it happened, a corner store in the very heart of the shopping district was available. It had formerly been occupied by a restaurant, the tile floor making it ideal for such a display, and it was accordingly hired for the period from May 15 to June 15.

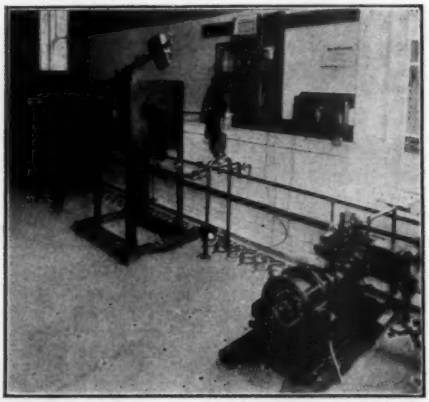
As the store was available only until June 15, and as equipment had to come by freight, the exact date of delivery being uncertain, the period from May 15 to June 1 was allowed for the installation and adjustment of the appliances, and it was planned to have the exhibit open June 1 to June 13.

There is a lot of detail connected with

An Abandoned "One-Arm Lunchroom" Makes an Ideal Exhibition Hall.

running a display such as the Worcester Company operated; advertising, special announcements to manufacturers and those particularly interested in specific processes, all have to be planned beforehand; show cards, signs and window displays have to be decided on and secured; arrangements for special programs or speakers have to be made and the layout and arrangement of the furnaces have to be decided on.

The method used for planning the arrangement of the equipment was that



Domestic Customers of the Company Received a New Impression of the Versatility of Gas.

customarily used to install machinery in a factory.

First, the store was measured and a layout of the floor plan, drawn to scale, was made. Next, the list of appliances to be exhibited was gone over, the floor space occupied by each determined, and pieces of cardboard cut out to scale to represent the various appliances.

By arranging these cardboards on the layout of the floor plan with due consideration to the location of gas and air piping, the final arrangement of all appliances was determined, not only to make a pleasing display, but also to require the minimum labor for piping and installation.

Looking at the main view of the complete exhibit, it will be noted that the appliances using atmospheric burners are grouped on the left, which made it unnecessary to run an air line on that side of the room.

The appliances using air are located at the right and to the rear of the store near the blower which permitted the use of a minimum length of air pipe. while the high pressure appliances are at the front on the right side close to the compressor.

Beginning at the right of the entrance, and following the wall around the store to the entrance again, the appliances shown were as follows:

Number 9½ C Nash Compressor Unit supplying gas at 10 lbs. pressure.

Number 721 Surface Combustion Oven Furnace with Bristol Automatic Control and Recording Pyrometer (High pressure).

Number 1900 Surface Combustion Rivet Heater (High pressure).

Number 315 Blodgett Insulated Oven equipped with Wilcolator.

Combustion Utilities burners.

Number 107 Gehnrich Closet Type Oven with Robertshaw Thermostat.

Number 420 Combustion Utilities Soft Metal Furnace.

Number 909 Surface Combustion Pot Hardening Furnace equipped with Brown Balanced Control and Recording Pyrometer

Number 100 Surface Combustion Forge (Low pressure).

Number 96 American Gas Furnace Co. Oven Furnace for high speed steel.

Number 1 A American Gas Furnace Co. Carbonizing machine with automatic Control.

Blodgett Doughnut Fryer.

Two sections of Vulcan Hotel Range with spreader plate, high shelf and broiler.

Vulcan candy stove.

Combustion Utilities candy stove with blower.

Combustion Utilities Cauldron Furnace.

10 S Kompak water heater.

1 G 4 Ideal boiler.

4 S 3 Bryant boiler and cutaway fuel control governor.

3 horse power Kane high pressure boiler.

In addition to the above, there were two tables on which was a display of smaller appliances such as glue heaters, brazing burners, soft metal pots, soldering furnaces, etc., while at the rear of the store was an illuminated transparency showing photographs of various local industrial installations.

Each appliance was supplied with a show card giving its name and a short outline of its uses, while catalogues of all appliances as well as copies of *Industrial Gas* were at hand.

Two Good Ways of Getting an Audience

Number One Crowd is Bigger, But Number Two is After Your Goods

By R. R. L. MacLEOD, Empire Gas and Electric Company

THE Empire Gas and Electric Company of Geneva, N. Y., has followed a rather unusual method of arousing interest in demonstrations of gas ranges. Instead of spending money for newspaper advertising, during the last two years it has offered this money to the various organizations at the rate of 25 cents for each member in attendance at the demonstration. Members were permitted to register for each day of the demonstration, but no one was permitted to register for two different organizations.

The registration cards were not collected until the end of the demonstrations, and thus every woman stayed until the end. After the count had been taken, the treasurer of each organization received a check, representing 25 cents for each member who registered each day. The organization having the greatest number present received a special prize of five dollars. Following is the form notice which was sent to the various women's organizations in the community:

Dear Madam:

We extend an invitation to the members of your society to attend a cooking demonstration to be held at three o'clock on the afternoons of

at

The demonstration will be in charge of factory representatives of the National Stove Company. Whole meals will be cooked unattended in the oven of a Direct Action Gas Range with Lorain Oven Heat Regulator. The baking of bread and special cakes will also be featured.

It has been suggested that we divide the money which would ordinarily be used in advertising these cooking schools, among the

HOW MANY ARE PROSPECTS?
Half the Battle Is Won If the Audience Is Already Interested in Gas Ranges When It Arrives.

women's organizations of our city. We have accordingly adopted the following plan:

For each woman attending the demonstration, twenty-five cents will be forwarded to the treasurer of the organization she wishes to represent. An extra prize of $5.00 will be given the society with the highest registration. In working for the prize, you need not confine yourselves to your own members; any woman who comes in may register for any society she wishes.

It is understood that each person can register for only one society each day. Come every day and bring your friends.

We hope this little diversion will afford you and your members several pleasant afternoons, and that we may have the pleasure of sending you a large check for your treasury.

Yours very truly,
EMPIRE GAS & ELECTRIC CO.

"In 1924, when we first used the scheme, we had an attendance of 2,900 women in ten different towns," the company reports. "This year we had only

REGISTRATION CARD

NAME_____

ADDRESS_____

PLEASE CHECK THE APPLIANCE YOU HAVE IN YOUR HOME

— GAS RANGE	— ELECTRIC VACUUM CLEANER
— COAL RANGE	— ELECTRIC IRON
— COMBINATION RANGE	— ELECTRIC WASHER
— GAS WATER HEATER	— ELECTRIC PERCOLATOR

CREDIT MY ATTENDANCE TO_____

THE REGISTRATION CARD MUST BE COMPLETELY FILLED OUT.
THE ORGANIZATION WHICH YOU DESIGNATE ABOVE WILL RECEIVE THE CASH DONATION FOR YOUR ATTENDANCE.

A Means of Raising the Attendance through Competition.

2,275. We attribute the loss in attendance to the fact that the women in the organization had heard and seen the demonstration before. The plan is very effective in securing a large attendance. However, we do not intend to use it next year.

"There are some weaknesses in the plan. Not all of those who attend are available customers on our lines, and others have purchased the very range which is being demonstrated. There is a tendency to pad the number in attendance, that is, to get young girls and people who live far from our lines to attend, merely to increase the amount received by a particular organization. This could be prevented by securing a list of the membership of each organization in advance of the meeting. Our local superintendents usually call the heads of the organizations on the telephone.

"We have another plan which also secures good results. We offer a range as a sort of prize, and this generally brings out only the women who have a real desire to possess a range of the type being demonstrated.

"We sometimes hold a guessing contest and let each woman guess how much gas is necessary to cook a certain amount of food. This has a two-fold advantage, for in addition to attracting the women to the demonstration, it also emphasizes the great economy of a gas range.

"With the first method, when societies are competing with one another, we get out a big crowd. The attendance is smaller under the second method, but almost everyone who attends is a prospect and the salesman need not waste his time in running down false leads."

"BRITAINS NEVER WILL BE SLAVES"

THE FOLLOWING EDITORIAL from the London *Gas Journal* will, we think, be read in this country with not a little incredulity and amazement as a further illustration of how difficult it is to alter the living habits of a people. Incidentally, the great mystery of the English teacup seems to be solved at last:—

Central heating is never likely to become the fashion in this country. People do not like it, and we do not blame them. Radiant heat is what is required for maintaining vitality and health. The subject cropped up in the course of a discussion at a conference of the Smoke Abatement League at Buxton. Dr. Bennett, the medical officer of health for the rural area of Warrington, stated that the need which has arisen for typists and clerks to be provided with a cup of tea morning and afternoon in offices where there is central heating is probably caused by the dry atmosphere of the rooms and the absence of ventilation. A feeling of lassitude creeps over people who have to work in such an atmosphere; and they have to restore their vitality by artificial means. Hence the cup of tea.

TECHNICAL SECTION
JOSEPH P. HAFTENKAMP, Chairman WALTER C. BECKJORD, Vice-Chairman
H. W. HARTMAN, Secretary

The Use of Oxygen in Gas Producers

Experiments Give Affirmative Answers to Queries Propounded by L. J. Willien

By ALFRED H. WHITE and HOWARD G. CHAMBERLIN

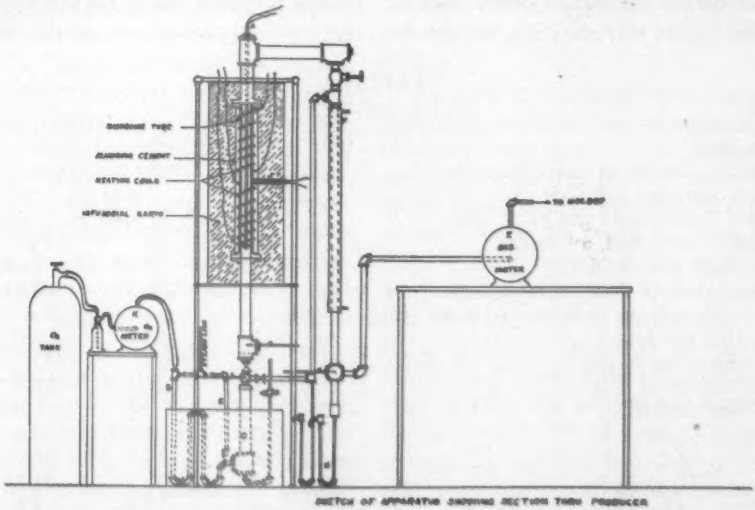
THE Proceedings of the American Gas Association for 1923 contain a paper by L. J. Willien on the complete gasification of coal by the use of oxygen. The following paragraph is quoted from this paper, p. 973.

"The complete gasification of coal by the use of oxygen is the most promising proposition that has been proposed. If 90% oxygen can be manufactured at a cost of 50 cents per M or less, its use in the production of gas assumes a very interesting aspect, and the gas industry should proceed to determine the feasibility of the process. A study of this problem would make a very interesting piece of research for some of the students taking fellowship courses supported by the different associations. As stated at the beginning of this paper, the process has never been tried, even on an experimental scale. Experiments should, therefore, be made to determine:

(a) The amount and quality of gas that can be obtained per unit of coal, and
(b) The control of the temperature in the hot zone by the use of steam."

The experiments set forth in the present paper do not by any means give the final answer to the questions raised by Mr. Willien but they do indicate that the problem of control of temperatures when using oxygen is not likely to be a difficult one.

The experimental furnace used in the



Line Drawing of Tube Furnace Used by Writers in Study of Oxygen in Gas Producers.

Presented before the Michigan Gas Association.

work was an electrically heated nichrome tube 2½ inches internal diameter and 36 inches long. Temperatures were observed by a pyrometer inserted from the top and projecting down the center to about 2 inches from the bottom of the coke. This pyrometer recorded any rise or fall in the zone of active reaction at the bottom of the bed of coke. Another pyrometer indicated the temperature of the nichrome tube at the middle of the setting.

The procedure was to heat the furnace electrically until it came to equilibrium at some temperature between 1800 and 2000°F. It would have been desirable to have used higher temperatures but it could not be accomplished without burning out the furnace. It would appear on first thought that the external heating would vitiate the results. It will be noted, however, that the lower thermocouple is directly in the coke and responds rapidly if the temperature changes.

The whole unit may be regarded as a small vertical cylinder cut from a large producer in operation. A rise or fall in temperature in the small cylinder may be damped by the surroundings, but the direction of temperature movements will be indicated unmistakably.

In the tests the small furnace was allowed to come to equilibrium of temperature through external heat, and then, without change in external conditions, a mixture of oxygen and steam was injected. If the temperature rose, it followed that heat was being evolved by internal reaction, and if it fell, it showed that heat was being absorbed. In practice it was found that the temperature could be controlled and moved up or down at will by varying the proportions of oxygen and steam. It seems, therefore, that an affirmative answer can be given to query (b) in Mr. Willien's paper cited above and that the temperature in the hot zone can be controlled by the use of steam.

Although the experiments give a fairly satisfactory answer to Mr. Willien's query as to the control of temperature in the hot zone of a producer they give only a partial and in some ways misleading picture of the quality and quantity of gas to be expected in commercial work. The trouble is mainly due to the low temperature necessitated by the metal tube in

TABLE 1
DATA OF TESTS

Test No.	12	13	14
Temp. at bottom of coke, Average °F.	1927	1609	1206
Steam admitted per cu.ft., lbs.	.202	.233	.275
Steam decomposed per cu.ft., lbs.	.085	.080	.076
Depth of coke bed, av. inches	25.	19.	25.
Gas made per cu.ft. O_2	3.84	4.46	3.95
Rate of flow of O_2 in cu.ft. per min.	0.175	0.293	0.311
Gas made calc. to cu.ft. per sq.ft. of grate area per min.	19.8	38.3	35.9
Heating value of gas in B.t.u. per cu.ft.	242.	234.	233.
Composition of Gas CO_2	23.1	26.7	29.9
Illuminants	0.0	0.0	0.0
O_2	0.2	0.4	0.2
CO	26.7	27.8	26.7
H_2	44.3	36.3	34.1
CH_4	1.1	2.6	3.4
N_2	4.5	6.2	5.7

which the work was carried on, and is partly due to the small scale of operation. The amount of steam was controlled by a hand-operated valve and it varied rather erratically with consequent variations in temperature. The column of coke was also shorter than desirable.

The results of the last three tests are summarized in Table 1. The temperatures given are averages observed in the bottom of the coke bed, where the influence of the reaction would be felt most promptly.

As mentioned before there was no difficulty in lowering the temperature by adding more steam or raising the temperature by decreasing the steam. There was, however, difficulty in adjusting the small valve so as to keep a constant flow of steam, and the temperature in a 20 minute run might fluctuate 200°F. solely because of difficulties in technique. This variation in temperature is one of the factors which makes it difficult to analyze the results in any quantitative way.

It is to be noted that all of the temperatures are below those necessary for good practice. Temperatures should be above 2500°F. and we have nothing as high as 2000° F. The natural result is excessive CO_2 in the gas and an unduly large proportion of steam going through the producer without decomposition. The high CO_2 varying from 23.1 to 29.9 per cent gives a low heating value varying from 242 to 233 B.t.u. per cu.ft. The steam entering is only about one-third decomposed, whereas in common water gas practice it would be half decomposed.

These unfavorable figures are mainly due to the low temperature but are secondarily due to the shallow fuel bed, which was only 20-25 inches deep. An attempt was made to overcome this latter factor by running at a slower rate. Evans* has reported a make of 70 cu.ft. of blue water gas per sq.ft. of grate area per minute. The rate we used in these tests varies from 20-36 cu.ft.

Our tests agree with one another more closely than might be expected in view of the varying temperatures in the several tests, and this is probably due to the influence of the external heating coils in the upper part of our furnace. It is impossible to operate a producer on the laboratory scale without external heat in its upper portion because of the relatively great radiation from the small unit, but the external heating disturbs the temperatures and, of course, the chemical equilibrium.

The combustion zone may be considered as terminated when all of the oxygen has reacted with coke to form CO_2. The gases at that point will consist of CO_2, CO, H_2 and steam with whatever N_2 may have been present in the oxygen. No more heat will be evolved by any desirable reaction as the gases rise in the producer. The temperature in the producer will therefore fall as further work is done by decomposition of steam to form water gas or by reduction of CO_2 to CO.

We know that both of these reactions must take place to a material extent above the combustion zone. In the present intermittent water gas practice nearly half of the steam escapes decomposition as it passes through the producer. This is in spite of the reservoir of heat in the upper part of the coke bed, whose temperature has been raised by the previous blow. In a continuous producer blown with oxygen and steam there will be no heat evolved after the oxygen has traversed the first few inches of coke. The gases passing through the first few inches of coke must carry sensible heat enough to

*Heat Balance in a Carburetted Water Gas Set Proc. Am. Gas. Inst. 7, 730 (1912).

keep a sufficient depth of coke at a red heat to complete the reaction.

If the reaction were as slow as in our experiments the picture would not be favorable. However, we know that the rate of both the reactions

$$H_2O + C \longrightarrow CO\ H_2$$
$$CO_2 + C \longrightarrow 2CO$$

increase rapidly with higher temperatures since they absorb heat. Therefore, at higher temperatures, say 2500°-3000° F., the reactions which absorb heat will proceed so much more rapidly that there is good ground to hope that there will be relatively complete decomposition of the steam in the first few inches of the fuel, and, therefore, a close balance of heat evolution and absorption in that area without needing much excess of steam over that theoretically required. If that can be done, the use of oxygen in gas producers will become primarily a commercial rather than a scientific problem, although much scientific work will have to be done on the details.

This paper gives a fairly definite affirmative answer to the query whether the temperature in the hot zone of a gas producer, using oxygen instead of air, can be controlled by steam. The gas made in our experiments is altogether too high in CO_2 to be commercial but this is due to the low temperature necessitated by experimental limitations. Theoretical considerations all lead to the belief that a satisfactory quality of gas can be made at higher temperatures. The query now is —How high must the temperature in the hot zone be to heat a sufficient thickness of coke to permit the secondary reactions to complete themselves satisfactorily?

Testing Gas Oils

By A. L. KELLY, U. G. I. Physical Laboratory

SOME work was done recently on the laboratory oil-testing set at the U. G. I. Physical Laboratory, Point Breeze, which brings out in an interesting manner, the fact that the comparison of distillation tests of gas oils may give misleading information as to the efficiency of the oil in B.t.u. per gallon.

Some months ago a 5-gallon sample of gas oil was received from a large oil company. The sample was supposed to represent the quality of oil that was to be shipped to one of the U. G. I. associated companies. A run on the oil-testing set gave a maximum efficiency of 107,500 B.t.u. per gallon between the temperatures of 1300 and 1360°F., proving it to be a fairly efficient oil.

About three months later a 5-gallon sample of gas oil taken from a tank car was received at the physical laboratory from the gas company which had been receiving consignments of oil from this same oil company. The gas company had been unable to obtain the efficiency in B.t.u. per gallon that had been reported by the physical laboratory on the original sample. A run on the oil-testing set of this oil gave a maximum efficiency of only 96,500 B.t.u. per gallon at temperatures between 1380 and 1410° F. The distillations of these two oils as reported by the chemical laboratory show both oils to be nearly identical as regards distillation, and one would imagine that both would give the same efficiency. An analysis of the hydrocarbons, however, shows a wide difference, and accounts for the difference in efficiency as determined on the oil-testing set.

The conclusion drawn from the above observations is that the comparison of distillation tests alone, without reference to the hydrocarbon analyses or an actual test on the laboratory testing set, is of little value as far as estimating the efficiency in B.t.u. is concerned.

The hydrocarbon analyses give only a qualitative indication that the efficiency of these oils will be not the same. For the actual B.t.u. per gallon the testing set must be resorted to.

Well, this seems to be as good a place as any to get ahead of the bunch and wish you all a Merry Christmas and a Happy New Year. So—a Happy New Year and a Merry Christmas to you all.—The Editor. P. S. And do your Xmas sendout early.

The Efficiency of the Oxygen-Carbon Dioxide Treatment of Carbon Monoxide Poisoning

With Additional Comment from Dr. J. A. Haldane

By CECIL K. DRINKER, M.D., Professor of Physiology, Harvard School of Public Health, Boston, Mass.

IN August, 1923, the Commission of the American Gas Association[1] for the investigation of carbon monoxide poisoning published a final report which contained three principal recommendations regarding treatment: (1) that the use of positive pressure ventilation apparatus such as the pulmotor and lungmotor be discontinued; (2) that the use of the prone pressure method of artificial respiration be broadened and encouraged in every manner possible; (3) that cases be treated by means of an inhalation of 95 per cent. of oxygen and 5 per cent. of carbon dioxide given by special apparatus. Three appliances for this purpose were examined by the Commission and passed as satisfactory. These devices are the H-H Inhalator, manufactured by the Mine Safety Appliances Company, 908-912 Chamber of Commerce Building, Pittsburgh, Pa.; the Industro Oxygenator Universal Model, manufactured by the Protecto Safety Appliance Company, 69 Warren Street, Newark, N. J.; and the Atmos Inhalator, Model C, manufactured by the American Atmos Corporation, 105 West 40th Street, New York City. The novel feature of these recommendations is the final one, and the present report is an effort to evaluate the accomplishments of the oxygen-carbon dioxide treatment. This treatment was devised by Dr. Henderson and Dr. Haggard of Yale University. Recognizing the fact that for every physiologic reason the immediate necessity in gas poisoning is a free flow of oxygen into the pulmonary alveoli, these investigators mixed oxygen with 5 per cent. of carbon dioxide, thus utilizing the stimulating effect of carbon dioxide on breathing in order to get a high concentration of oxygen in the lungs.

A word here on the general question of the use of apparatus in the emergencies of resuscitation is pertinent. Objections to apparatus have been of two sorts:

1. The devices marketed for such use, notably the pulmotor and lungmotor, are not consistently reliable for delivering air or gas mixtures to unconscious moribund individuals. This objection is based on careful medical examination of available appliances. It constitutes a scientific denial of the uniform efficiency of apparatus blowing air or air mixed with oxygen into the lungs of patients through a face mask placed over the mouth and nose and withdrawing waste gases through the same route. The inhalation method of resuscitation depends on stimulating the patient's natural breathing. It merely offers the patient 95 per cent. of oxygen which he is caused to breathe three to five times as vigorously as normally because of the addition of 5 per cent. of carbon dioxide. When this method of treatment was first recommended two years ago there was no reason to believe it would not be perfectly safe and effective in non-

[1] The Commission was composed as follows: Dr. Walter B. Cannon, Professor of Physiology, Medical School of Harvard University. Dr. David L. Edsall, Dean, Medical School of Harvard University, and Professor of Clinical Medicine, Medical School of Harvard University. Dr. Howard W. Haggard, Instructor in Applied Physiology, Yale University; Consulting Physiologist to the United States Bureau of Mines. Dr. Lawrence J. Henderson, Professor of Biological Chemistry, Medical School of Harvard University. Dr. Yandell Henderson, Professor of Applied Physiology, Yale University; Consulting Physiologist to the United States Bureau of Mines. Dr. Francis W. Peabody, Professor of Medicine, Medical School of Harvard University. Dr. Royd R. Sayers, Chief Surgeon, United States Bureau of Mines; Surgeon, United States Public Health Service. Mr. Charles B. Scott, Accident Prevention Committee, American Gas Association. Dr. Cecil K. Drinker, Chairman, Professor of Physiology, Harvard School of Public Health.

medical hands and all the data available confirm this.

2. Field workers on resuscitation object to all forms of apparatus on the ground that mechanical appliances are never on hand when needed and that they tend to get out of order. The argument of unavailability is particularly important in connection with electric shock. Shocked persons whose hearts are still beating but who have stopped breathing have about ten minutes to live unless given artificial respiration at once. It is consequently wise to advocate prone pressure artificial respiration as the preeminently important reliance in such accidents. Gas poisoning is different. Every source of evidence shows that the vast majority of gassed persons are breathing when found and the condition from which they are suffering is remedied specifically by oxygen. Oxygen cannot be given without apparatus and it can be given more efficiently if the apparatus is designed to offer 5 per cent. of carbon dioxide at the same time. Carbon monoxide poisoning thus presents a specific need for apparatus which cannot be denied and which makes it necessary to recommend that, while all persons who may come in contact with cases of gas poisoning be trained in artificial respiration, it be made possible to use inhalation apparatus at the earliest possible moment. In regard to the mechanical ruggedness of the appliances recommended by the Commission, little need be said. No complaints of breakdown have been received. If adequately inspected, the inhalers are reliable. Their use has presented only one point of difficulty, namely, the securing of an adequate supply of oxygen-carbon dioxide cylinders. In several instances gas companies have solved this trouble by filling the empty cylinders themselves. Commercial oxygen and carbon dioxide are quite safe for this, and where use is large a degree of independence and safety of supply is assured which is most advantageous. The companies selling approved inhalation apparatus have made every effort to provide a reliable supply of the standard mixture and the present difficulty does not seem much greater than that involved in any delivery requiring railroad shipment. It exists, however, and should be considered when inhalation apparatus is installed in isolated sections.

SOURCES OF DATA ON THE NEW TREATMENT

The crucial points involved in a consideration of the efficiency of the new treatment are apparently the following: (1) Are the unpleasant effects of minor degrees of gassing caused to disappear more rapidly if the oxygen-carbon dioxide inhalation is used? Should this be the case, the treatment must be of value wherever it is important to shorten disability and to reduce the familiar, minor, unpleasant after effects of carbon monoxide poisoning. (2) Has the inhalation treatment proved effective in bringing about the rapid recovery of seriously gassed patients? (3) Has it proved practically possible, in the rare and most serious cases of gassing where breathing has ceased, to use the inhalation treatment in combination with prone pressure artificial respiration, stopping the artificial respiration as natural breathing becomes established?

In order to obtain data relating to these points, I have secured from the three manufacturers of inhalation apparatus the names of firms and organizations to whom they have made sales. At the present time, 300 firms possess inhalation apparatus. A vast majority of these have bought the H-H Inhalator, but there are enough of the other two types in use to convince me of their entire efficiency; and beyond the fact that one of the three approved devices has had a numerically larger field test, there is no evidence leading to the recommendation of a single machine to the exclusion of the others. The exact number of inhalers in use is of course much in excess of 300, since many firms require a fair number in order to meet their needs. The exact total

is, however, of little importance. It is evident that distribution has been wide and that there has been a good opportunity to try the new treatment in the field. All the purchasers of inhalation apparatus have received the following letter:

Several years ago I was made chairman of a commission instituted by the American Gas Association to examine methods of resuscitation in gas poisoning. As one of the most important achievements of this commission, Doctors Henderson and Haggard devised the inhalation method of treatment. This treatment became available two years ago and it now seems appropriate to make an inquiry in order to discover how efficient it has been. I have, therefore, secured from manufacturers a list of purchasers of inhalation apparatus and am consequently writing to you since the name of your firm (or hospital) appears on this list.

Will you be good enough to give me your opinion of the efficiency of the inhaler together with any actual data you may have collected as to its achievements? It is exceedingly essential in evaluating any measures in regard to resuscitation to know the condition of the patient when resuscitative measures were applied and the most important element in reporting this condition is the breathing. Do your records contain anything in regard to this? And is it possible in the future to see to it that they do? No description is required other than the rate of breathing and some comment on the depth. Rescue crews are so well organized and composed of such intelligent men that it has proved easily possible to obtain these data if the crews in question are aware of its importance.

Will you be good enough to give me any information possible and wherever circumstances permit, will you include a note upon the breathing in all future reports upon cases that come to treatment with inhalation apparatus?

Where replies to this letter were not received the inquiry was repeated and in many instances third letters dealing with specific points have been sent. In tabular form the data obtained are as follows:

Total purchasers	300
Total replies	180
Number reporting actual field use of apparatus	86
Total number of cases reported with sufficient detail to be included in this report[3]	110

No replies unfavorable to the inhalation treatment have been received. In several instances questions have been asked as to the propriety of using the lungmotor or the pulmotor with the inhalation treatment. These specific questions will be discussed later in this report. They have involved special points and have not dealt with the broad and more important matter of actually discarding the inhalation method and returning to former appliances. *There is absolute unanimity of feeling, wherever the method has been tried, that it represents a decided advance upon former practices.*

In a few cases the replies have come from physicians. Most of them are the direct reports of non-medical rescue men. It would of course be ideal if data on this subject could be supplied by physicians with special experience in carbon monoxide physiology. This is quite impossible. The great majority of gassed cases in this country are attempted or successful suicides. They are usually seen first of all by the police, and most frequently receive their first systematic treatment from the emergency crews of the gas companies. Owing to the facts that resuscitation from gas poisoning is badly taught or entirely neglected in most medical schools, the young ambulance surgeons who reach the scene next have little effect on the outcome.

Several years ago the author and Dr. Cannon made an effort to get some information on gas poisoning from hospital records in Boston, New York, and Philadelphia. In grosser aspects this effort was successful, but as an inquiry into the details of a common disease it failed because in most instances details were not given. At the present time it is impossible to get information on the condition of gassed patients at the time resuscitation measures are applied from properly qualified medical men except in rare instances. The accomplishments of resuscitation cannot be evaluated without this early observation and it does not need to include very much. Conscious-

[3] In many instances firms have reported successful treatment of "several cases of gassing" and have been unable to supply details. It is certain that the total number of asphyxiated persons whose experiences are reflected in this report is not less than 150, but the author has confined his actual discussion to those cases presented with some thoroughness.

ness, or unconsciousness, the general appearance of the patient, and above all the rate and character of the breathing give the information most needed. Experienced rescue men note these points and all rescue men should be taught to observe them. Reports on gassed cases ought to contain the following items:[3]

1. Condition prior to asphyxiation (drunk, previous illness, etc.).
2. Time elapsed before discovery.
3. Time last seen or heard.
4. Condition when discovered:
   - Conscious; unconscious.
   - Breathing—rate per minute.
     - General character:
       - Gasping and slow.
       - Shallow.
       - Rapid and weak.
       - Increased.
     - Pulse—rate per minute.
     - General appearance of patient.
5. Resuscitation methods used:
   - Length of time of application of inhalation treatment.
6. Condition at end of inhalation:
   - Breathing.
   - Pulse.
   - General.
7. Condition next day.

Rescue men in the gas companies, together with policemen and firemen, should receive instruction in noting these points. The author has had a personal opportunity in the case of one large gas company to experiment with instruction of this kind and believes it has "taken" well. Certainly the enhanced interest of the men, a natural consequence of knowing more about what they are combating, is most advantageous in securing high grade rescue work.

There is an apparent contradiction in contending that emergency men make reports of sufficient value for use and in then supplementing this with a suggestion for systematic instruction in obtaining certain items of medical information. There is, however, no line of effort involving large groups of men in which training will not bring improvement and the evidence which follows constitutes the best argument for the author's view that the present non-medical sources of data are a convincing endorsement of the inhalation treatment.

Evidence

1. *On the Value of the Oxygen-Carbon Dioxide Treatment of Mild Gassing*

1. In reply to your letter of March 27, in regard to our H-H Inhalator, would say that so far we have not had occasion to use it on any serious case of asphyxiation. We have used it on some of our men who have been somewhat overcome while working in the purifying house. The response was immediate, and in each case the employe came through his experience without the severe headache which usually goes with this sort of difficulty. (Salem Gas Light Company, Salem, Mass.)

2. There is an immense amount of satisfaction in the fact that you can now take a man that is gassed to the point of unconsciousness and at the expiration of twenty-five minutes' use of the inhaler, send this man out, smoking his pipe and feeling as well as when he came to work—not even a headache. The above happened some time ago with our employe, Mr. F. H. He had been clinking on the producer—Koppers Kerpely type—and had been working about four hours before showing any bad signs. As soon as it was noticed that he was ill, he was carried to the office. By this time—probably two minutes had elapsed, and the patient was groaning and as far as we could tell, was unconscious. The inhaler was applied and sufficient carbon dioxide-oxygen gas supplied to hold a light pressure of ten liters on the bag, making sure that the patient was getting no outside air. His breathing rate at this time was 45 and the pulse 87. Within possibly two minutes, he was taking 15 liters but—how he did breathe! He fairly groaned and when asked if he felt better, he answered that he did. At the end of 25 minutes, he got up, lighted his pipe and was put to work on a different job, and worked the rest of the day feeling fine, having no headache and no lost time.

Inasmuch as you have the report of the cases of H. H. and F. M., we will next take up the case of W. B. W. I am sorry to say I was not at the plant when this case started so did not get the pulse and breathing rate. I did arrive after the first bottle of carbon dioxide-oxygen gas was used. This man was attempting to fix some small CO gas leaks on the feed valve levers of the producer. He was getting a little gas now and then, and worked through until the lunch hour, feeling somewhat the effects of the gas. He went to a boarding house close by the plant and ate a warm dinner and at 12:30 went back to his work. At 1:30 he managed to walk to the shop, a distance of 300 feet where he laid on the floor, becoming all but unconscious. At this time the inhaler was applied, one bottle of the carbon dioxide-oxygen gas being used. He was

[3] The items suggested need not make a separate report but can be included in the general report form covering gas accidents.

helped to the door where he vomited. He again laid down and from all appearances and actions of the patient, we thought he would faint. However, two more bottles were used which brought him around in fine shape except for a bad headache, from which cause he went home at 3:30 p.m. He was back at work the next day, feeling as well as ever, according to his own report. (Battle Creek Gas Company, Battle Creek, Mich.)

3. Thus far, we have administered the combination to many minor cases but have been fortunate enough to avoid having any cases of complete asphyxiation.

In such cases as just mentioned, reports from all stations agree that cases which formerly had symptoms justifying their being sent home for a day or two, now are given a few minutes' treatment by inhalation and go back to work apparently none the worse. (Philadelphia Company, Pittsburgh, Pa.)

4. The Emergency Crews were instructed to rely wholly upon the Schafer prone pressure method of resuscitation, plus the H-H Inhalator which we purchased from one of the companies whose product was approved by the Commission on Resuscitation. In order to insure utter reliance upon the Schafer method in conjunction with the inhalator, the lungmotor equipment was not available. Under this practice our crews continued to resuscitate victims of carbon monoxide poisoning, and it was noticeable that the victims of this poisoning recovered more rapidly than under the former method and the severity of the after effects of the poison was appreciably lessened. (Detroit City Gas Co., Detroit, Mich.)

5. Herewith is a card on the first real gas case in which we used your inhalator.

This man was working about the bosh of a blast furnace on last Saturday, which was a day of rain and heavy atmosphere. One of the foremen saw him start to fall and caught him in his arms and ran with him to the rescue station. After using the inhalator about a minute, he started to revive and after about ten minutes of inhalation he went back to work and reported no ill effects.

We are naturally much pleased with the work of the machine and feel that it is going to be a great help. (This is the experience of a large steel company in the Pittsburgh District.)

6. Your letter concerning the H-H Inhalator has been referred to me for reply.

We have had this outfit for use in our Receiving Ward and Ambulance since about August, 1924, regarding it as a very valuable measure of resuscitation, as it is used about once a week for gas poisoning cases.

It would be impossible to tabulate the number of cases at the present time with any extensive data, since we are extremely busy, but it is our impression that:

(1) Cases which are not breathing, respond fairly well to artificial respiration which can be stopped as soon as breathing reaches six to ten times a minute.

(2) That the depth of inspiration is more marked than the frequency of respiration with this procedure. (We understood that the rate of respiration would be increased almost double normal, but have not found that this is so.)

(3) In the frequent type of case, where the patient is not unconscious, we are able to relieve the headache and send the patient home.

In conclusion, I am sorry not to be able to give you more accurate information, as this has been regarded as a routine procedure and is no longer an expensive toy. (Presbyterian Hospital, Philadelphia, Pa.)

7. On the first man, we used the H-H Inhalator for about twenty minutes and it cleared him up so that in an hour he was perfectly normal and insisted that he go back on the job, which he did with no ill effects from the gas.

The second man was at the gas plant and had a very bad case. He had been working and inhaling gas from a bad leak for a long time and while he was not unconscious, he had taken a lot of gas. We worked on him for about thirty-five minutes and he cleared up splendidly, had no headache and said he felt as well as ever. However, we took him home and the next morning he was back on the job and informed the foreman that he felt no ill effects. (Public Service Company of Colorado, Denver, Colo.)

8. Fortunately we have had no occasion to use it in a severe case of gas poisoning since its purchase. The only use it was put to was in cases of headache caused by gas and we found it very effective for this. Our only criticism is that the gas container is too small and so empties too readily. However we are now supplied with Carbon Dioxide tanks and can do our own refilling. (City of Holyoke, Mass., Gas and Electric Department.)

9. Most of the cases on which this apparatus has been used were among our laborers, however, none of them inhaled enough gas to cause them to lose consciousness. In practically every case, we found that by treating them with this apparatus they were able to continue their work with only slight discomfort. We are very well pleased with the workings of the apparatus. (Galveston Gas Company, Galveston, Texas.)

10. All the rest of our cases have been very light cases and this treatment has shown wonderful results with quick recovery. This is especially true in case of men overcome with producer gas where the treatment restores them to normal health in a very short time leaving practically no ill effects whatever, the men not even complaining of headaches and going directly back to work. (Utica Gas and Electric Co., Utica, N. Y.)

This evidence on mild gassing is of especial importance to all gas manufacturers. It brings them assurance that the minor emergencies which occur from time to time even in the most modern

surroundings can be reduced in significance by the use of a brief period of inhalation. No one can breathe the oxygen-carbon dioxide mixture without a decided increase in ventilation with oxygen, and the prompt removal of carbon monoxide lessens the annoying consequences of moderate gassing.

II. On the Value of the Oxygen-Carbon Dioxide Treatment of Serious Gassing, Breathing Being Still Present When Inhalation Was Begun

1. A man intoxicated with moonshine made an attempt at suicide by inhaling gas from a gas tube placed in his mouth. When he became unconscious, the tube fell from his mouth and he was later found and rushed to the hospital. According to Dr. X, who attended him, the man's breathing was very, very shallow. The inhalator was put on and in one minute and a half the man began to show signs of deeper breathing. The inhalator was then removed and the man at once relapsed into shallow breathing. The inhalator was replaced and at the end of seven minutes the man was taking very deep breaths. In this case respiration had never been fully suspended, but the rate was about 14 per minute. The Schafer method of resuscitation had not been necessary. The man's pulse was of fair quality, due probably, according to Dr. X, to the stimulus of alcohol. Eye reflexes were present and there was no indication of nausea. Needless to say Dr. X was much pleased with the results of the inhalator. (Haverhill Gas Light Company, Haverhill, Mass.)

2. This accident occurred on January 17, 1924, at 24 Hunting Street, Cambridge. We understand that gas had been escaping probably from midnight on January 16th, until about 9:30 a.m. on the 17th. A tube was accidentally pulled off the gas jet and was only discovered after the boarder had gone to another house, one-half mile distant, and returned with a woman to take care of the children who were sick during the night. I understand some of these patients slept on the floor so probably did not get as much gas as they would have if they had been in bed. The father, son, and daughter were taken to the Cambridge Municipal Hospital and two apparatus, the H-H type, were obtained from the Gas Company and were used for a period of about four hours. The father evidently had been drinking and although unconscious, at the time I first saw him, revived within fifteen or twenty minutes and received no further treatment from the apparatus. The boy and girl were both unconscious and were given oxygen and carbon dioxide gas at intervals for a period of four hours. Very little hope was expressed in regard to the girl, but the boy became conscious during treatment and called for his father. After gas had been administered for probably two hours at intervals, the girl started to have violent convulsions and we decided to let them breathe the fumes of ammonia. This seemed to have a quieting effect, they breathed easier and the pulse began to drop appreciably. The doctor in charge washed out their stomachs with salt and water and at 2:30 they were taken up into the ward and we were told that our apparatus was no longer required. We found that the boy died early the next morning, but the girl recovered. (Cambridge Gas Light Co., Cambridge, Mass.)

3. It is very probable that we have never kept such accurate record of our experiences with the inhaler as desired, but our experiences have satisfied us all that it is far ahead of the pulmotor formerly used by us. We feel sure that with the inhaler, at least three lives have been saved in three times used. The last time used, which was December 18, 1924, Mrs. A. S. was to all appearances dead. This was a case of escaping coal gas. On April 21, 1924, at 6 a.m. one G. C., a very old man, was overcome by illuminating gas and found practically dead, he then being black. Officers worked on him at least 30 minutes with the inhaler and revived him. On March 19, 1924, at 3:30 a.m. one C. B. attempted suicide by illuminating gas, was to every appearance dead, and officers revived him after long efforts. On March 10, 1925, at 3:30 p.m., one H. L. H., while working in telephone company manhole was overcome, brought to surface by a fellow workman, and officers found him unconscious. With inhaler they revived him. (Police Department, Quincy, Mass.)

4. The H-H Inhalator was installed in all of our gas and electric plants a little over a year ago but I do not believe up to the present time we have had sufficient experience with this instrument to give you a great deal of detailed information as to its efficacy. We had one rather severe case, however, at the Fort Dodge Gas and Electric Company where a man of about 60 years of age was overcome with illuminating gas. The patient was entirely unconscious and respiration was very slight. Artificial respiration was of course started at once and after the instrument arrived and the patient started inhaling the gas, it was only a period of twelve minutes until he had regained consciousness. (United Light and Power Company, Davenport, Iowa.)

5. The third man was in a ditch repairing a broken pipe and he was unconscious when they got him out although he was breathing. Through a mixup in the telephone calls, the City ambulance got there before we did and took the man to the General Hospital. On arriving at the hospital which must have been about thirty minutes later he was still unconscious, and they were giving him straight oxygen. We started in with the H-H and in about fifteen minutes he was so he could talk. We continued to use it for about forty-five minutes and in about an hour his pulse was good, he had no headache and wanted to go

home. In an hour and fifteen minutes from the time we got there, he dressed and we took him home. Next morning he reported for work and said he felt no ill effects from the gas. (Public Service Company of Colorado, Denver, Colo.)

6. Hired man sleeping in a separate building found by employer in closed room with coal stove smoking and throwing off gas, time in this condition unknown although remembers awaking and realizing condition but unable to get out of bed. When we arrived with machine he was unconscious, cyanosed, respiration very shallow and irregular, 3 to 4 per minute, but at times ceased for nearly one minute. This was timed by employer's brother. Inhalator was used for about twenty minutes in two intervals as after first time, respiration became weaker and shallow but improved quickly when Inhalator was reapplied. After final stopping, respiration was about twenty, color good. Patient had a headache for several hours and some bloody sputum for about one day, except for this had an uneventful recovery. (Fire Department Headquarters, Redfield, S. D.)

III. On the Value of the Oxygen-Carbon Dioxide Treatment of Gas Asphyxiation When Breathing Has Stopped and the Prone Pressure Method of Artificial Respiration is Used with the Inhalation Mask in Place

Cases falling into this category are not frequent and are the most serious test to which the new method can be subjected. The results so far obtained show that operators skilled in the prone pressure method can readily obtain a sufficient degree of ventilation to fill the lungs with the oxygen-carbon dioxide mixture and, this attained, spontaneous breathing tends to begin with encouraging readiness.

1. Upon being advised of the case at my office, which was about two miles from the point where the man was overcome, I immediately detailed a man from our Coke Plant Department to rush the H-H Inhalator to the scene of the accident where the men were working on him. He had, however, been resuscitated twice by artificial respiration before the Inhalator was used and became unconscious while being carried on a stretcher to our gate where the ambulance was waiting for him. After the inhalator was used, in connection with artificial respiration, he responded very quickly and did not lapse into unconsciousness again. (Bethlehem Steel Co., Johnstown, Pa.)

2. The first case was an employe of a local gas company who had accidentally inhaled a large quantity of gas containing CO. He was hauled to our plant in a truck with two men holding him as he was in convulsions and was struggling and fighting for air. Before he could be placed in position to have the oxygen-carbon dioxide administered, he had ceased breathing entirely and it became necessary to use the prone pressure method of resuscitation in conjunction with the Inhalator for about twenty minutes, at which time the victim was breathing of his own accord. The doctor made an examination of his condition at this time and recommended his removal to a hospital to recuperate. He remained in the institution three days and reported to his company for duty three days later. (Domestic Coke Corporation, Fairmont, W. Va.)

3. The first case in which I used it was on an old gentleman, 75 years old. I got the call at 6:15 a.m., December 26, 1923. This man was not breathing when I arrived. I proceeded to get the patient into position for resuscitation, prone system, and had mask adjusted and started apparatus. After working on him for 20 minutes, I had him breathing and within half an hour, he was talking. After this I got him into a warm bed. This man was not taken to the hospital nor did we have a medical man present.

Case 2. September 8, 1924. On this occasion I was called to Victor Avenue, where one of our repair men, R. G., was overcome. He was repairing a broken main and had the sidewalk undermined.

This man was not breathing when I arrived but after about 15 minutes of the Prone Method and the inhaler, I got him breathing and talking and had him sent home in our car.

Case 3. This was a case of attempted suicide but not like the other cases, the police and doctor were present and were using a lungmotor and told me I was too late. I asked the doctor if I should use our apparatus. He said I could try if I liked, so I started and, within a half hour, I had the man, who was between 60 and 70 years old, in a condition to have him removed to hospital. (The Consumer's Gas Co., Toronto, Canada.)

4. I am in receipt of your letter of April 19, relative to the treatment of a case of gas poisoning and in reply would state that this man was overcome by a mixture of 65% coal gas and 35% water gas. It was necessary for us to carry him down from the walk on the holder tank across the yard to an adjoining building. We immediately started to use the prone method and in two or three minutes the victim seemed to stiffen and we thought we were going to lose him. A new oxygen and carbon-dioxide apparatus had just arrived and we started to give him this mixture. Very much to my surprise he regained consciousness within a very few minutes and we then laid him on a cot covering him with blankets to keep him warm. Shortly afterwards he lapsed into unconsciousness and two applications of the oxygen and carbon dioxide revived him very quickly. A doctor who had previously been called, upon examination

stated that the patient's heart action was slow and he gave him a hypodermic injection of atropine. In a very short time the man became violent and the doctor said that he had a gas jag. The doctor left at this time. It took six men to hold the patient during these periods of convulsion which lasted for about three-quarters of an hour and then finally subsided. For two or three days afterwards the man was physically tired and lame, due I think, to these violent convulsions. I was very much surprised and pleased at the quickness with which the man was brought back to consciousness and I believe he would have been much better off physically if the hypodermic injection of atropine had been omitted. (Cambridge Gas Light Co., Cambridge, Mass.)

5. With reference to your letter of March 21st, inquiring as to the condition of Mr. H. when asphyxiated, wish to advise that the attending physician informed me that when he arrived on the scene, Mr. H. was entirely pulseless at the wrist. Just prior to the arrival of our men with the Inhalator, the attending physician injected a solution to stimulate the heart; this, however, did not have time to take effect before the Inhalator was put in operation along with artificial respiration. (Iowa City Light and Power Company, Iowa City, Iowa.)

6. Since the purchase of this instrument our men have only had one occasion to make use of it on an asphyxiated man whose breathing had entirely ceased. The report submitted gave us the information that the patient was apparently not breathing. At the time of arrival of the rescue crew only an occasional sigh was noted. The prone pressure method of resuscitation was at once started and the H-H Inhalator applied. The patient began to breathe quite deeply after five minutes from the time resuscitation measures were first applied. Fifteen minutes later he was able to breathe without external aid. After two days in the hospital the man returned to his occupation as a laborer doing trench work. (Lowell Gas Light Co., Lowell, Mass.)

Discussion

These direct accounts of gas accidents possess an informality which may cause them to be viewed with some distrust by those who have had serious investigative contact with the subject. At the present time carbon monoxide poisoning from all sources, fires, automobile exhaust, industrial accidents and manufactured gas, is a more serious medical problem in the United States than poliomyelitis or smallpox. It would seem that accounts of cases should have all the completeness and finish characteristic of the best medical reports, but as I have pointed out this is not and indeed cannot be the case. The author has great faith in data submitted by persons who view their work in a true spirit of interest and critical inquiry. He is convinced that such a spirit does actuate the men whose reports and opinions make up the vital part of this review. It is true that in many of the cases cited the patients would have recovered if they had been brought into the air and been left alone; and it is equally true that these individuals would have recovered if they had been treated by appliances other than the new inhalers. The strongest points in the general evidence seem to be the facts that the men reporting have had ample experience with prior forms of resuscitation and that in spite of this they feel the new technic provides recovery more rapidly, more certainly, and with fewer unpleasant after effects than has been possible in the past. Not all of this feeling can be due to the natural tendency of men to follow a new and highly endorsed medical maneuver. New remedies always gain a following, but the following in this case consists of men old in the work at hand, and it has grown steadily during two years.

Against the affirmative evidence submitted I have been able to find a small amount of counter opinion. Sayers and Yant (1) in 1923 studied the rate of elimination of carbon monoxide from the blood under air breathing, oxygen breathing, and oxygen plus carbon dioxide breathing. They found that the "CO_2 mixtures removed the CO from 25 to 50 per cent faster than did the pure O_2." They continue: "Henderson states breathing CO_2-O_2 mixtures produces an increase in blood pressure. This probably causes an increase of flow of blood through the lungs, and would thus aid in the elimination of CO; but in victims that have been gassed over a comparatively long period (several hours), the heart might perhaps be weakened and unable to withstand the increased stimulation for breathing caused by the CO_2.

However, if the patient is under constant observation, overstimulation may be avoided by temporarily stopping the use of the CO_2-O_2 mixture; or, as suggested by Henderson and Haggard, this effect may be prevented by the administration of atropin. Lower percentages of CO_2 in O_2 produce less effect; and it is hoped that a safe percentage may be found for routine first-aid work."

The same criticism is found in a brief monograph on "Carbon Monoxide Gas Poisoning" by Rossiter (2): "Their experiments (referring to the work of Henderson and Haggard), as well as those performed by the Bureau of Mines, have shown that a very much quicker resuscitation is obtained when the Carbon Dioxide is used.

"However, it must be remembered that these experiments were performed on cases where the saturation of the blood with the CO was not over 40 or 50%, and while there is no doubt about the CO_2 increasing the depth and number of respirations, yet it must also be remembered that in severe cases of gassing the percentage of saturation is much greater and that the heart is greatly weakened, so that with this sudden excessive stimulus it may fail. I would not, therefore, recommend this form of treatment, except in expert hands, nor do I believe that in its present state of development it should be used in the severe cases of gassing."

The author is not clear as to what is meant by overstimulating the heart. It is true that carbon dioxide inhalations do raise the blood pressure and it has recently been shown that such inhalations increase the blood flow through the lungs in human subjects. It seems impossible to describe any two reactions which express improvement of the circulation more emphatically than do the two mentioned. Blood pressure falls badly toward the end of carbon monoxide poisoning, and cardiac output suffers. A low blood pressure and a reduced output of blood cause a poor coronary circulation and the vicious circle which results turns to the heart muscle as the seat of serious damage. High concentrations of carbon dioxide in the blood will cause the heart to fail, but there is no evidence that such concentrations as are attainable by use of the 5 per cent of carbon dioxide provided by the new treatment can do harm. On the other hand, there is ample evidence to show that a normal carbon dioxide content of the circulating blood gives better cardiac function than reduced carbon dioxide. Henderson and Haggard have shown that not infrequently, and essentially in prolonged poisoning by carbon monoxide, the blood carbon dioxide is reduced. All the information at hand would suggest that with the exception of increasing the blood oxygen no measure could be of more benefit to the heart than bringing the blood carbon dioxide of such patients up to normal and that the concentration of carbon dioxide attainable from the gas mixture used in the inhalation treatment cannot rise high enough to be anything but beneficial. It is well to be cautious in regard to a new medical procedure but in this particular matter the very abundant information on the physiologic effects of carbon dioxide on the heart, coupled with the experimental and field results on the effects of the 5 per cent. carbon dioxide concentration used in the inhalation mixture seems to set at rest the suggested objection.

A recent paper by Nicloux (3) and his associates verifies the general finding that breathing 95 per cent. of oxygen plus 5 per cent. of carbon dioxide gives a more rapid removal of carbon monoxide from the blood than is attainable in any other way. The experiments cited are on two dogs and differ from American results in the shape of the elimination curves and perhaps most essentially in the fact that little difference in the speed of carbon monoxide elimination exists in favor of the oxygen-carbon dioxide mixture over pure oxygen. This paper may cause a further technical exploration of certain features of carbon monoxide poisoning,

but it is not a criticism of the new treatment.

A further point which has come to attention repeatedly during the past two years appears in Rossiter's (2) paper: "The Carbon Dioxide and Oxygen treatment can be used with the Pulmotor by charging the tanks accordingly, but by so doing the amount of oxygen reaching the lungs is decreased." This statement is incorrect. During the work of the Commission the members were asked to approve a simple oxygen inhalation apparatus for use with the oxygen-carbon dioxide mixture. Owing to the fact that the inhaler for oxygen alone was not built to meet the quick increase in volume of breathing which occurs when carbon dioxide is present, this simple arrangement failed of approval. It is not possible to use the inhalation feature of the pulmotor with the oxygen-carbon dioxide mixture and the same thing applies to other apparatus not especially constructed for the purpose. The question has also been asked as to whether it would not be a good thing to use the oxygen-carbon dioxide mixture on the positive side of the pulmotor or as the gas pumped in by the lungmotor. In the case of the pulmotor the amount of carbon dioxide delivered in this way would not be above 3 per cent. at the best and the oxygen would be in the neighborhood of 40 per cent. The lungmotor would deliver the full concentration of 95 per cent. of oxygen and 5 per cent. of carbon dioxide, provided the mixture really reached the lungs. It is the unreliability of these two devices for accomplishing this end which caused the Commission to recommend that their use be given up; a mere change in the gas mixture utilized cannot affect this recommendation. The third body of evidence submitted deals with cases in which breathing was absent and the initial move in resuscitation was a successful combination of prone pressure artificial respiration and an approved inhaler. It is not necessary to carry other devices. Training in artificial respiration and the inhalation treatment are our best resource in gas poisoning.

In line with the above discussion, questions have arisen in the following communication which are of much interest:

We do, however, occasionally encounter cases where the application of the prone pressure method of resuscitation seems to us impracticable, or actually impossible. We therefore beg leave to make inquiry concerning some of these cases, as to what you would recommend, since in our experience, the lungmotor seems to be the only means applicable. As you know, the Gas Company is frequently called on to attempt to revive persons who are unconscious and apparently dead due to other causes than the inhalation of gas fumes. One instance of this nature is given below:

Recently our Emergency Crew responded to a call from a physician on a maternity case. A child had been born whose heart was beating but breathing could not be started. There were two doctors in attendance, both of whom agreed that the Schafer method or Sylvester method of resuscitation could not be applied, because of the size of the infant and because it was so fragile. Both doctors in attendance, as well as our emergency men, believed that a lungmotor would have been useful in this case. The doctors indicated that the reason they sent for the Gas Company was because of their belief that a lungmotor was included in their equipment. In any event, all available efforts to save this infant's life were unavailing.

Another instance where the prone pressure method would appear inapplicable was that of a woman in late stage of pregnancy who had been overcome by gas fumes while lying in bed. Fortunately, the patient referred to was breathing, and it was possible to stimulate breathing further by the use of the CO_2 and Oxygen mixture. We are desirous to have your suggestion as to what procedure our emergency men could have followed in case upon their arrival the patient's breathing had stopped.

It is also possible to imagine other examples, such as that of a very old person, or person suffering from a heart attack, where it would be dangerous to move the subject from bed to floor in order to apply prone pressure method satisfactorily.

It is not the intent of this letter to offer arguments in favor of the lungmotor, but we are seeking your advice on cases of unusual nature such as described above. Our emergency men are looking to us to give them definite instructions and we do not feel capable of giving this advice or instruction just yet. May we hear from you in this regard? Be assured whatever helpful suggestions you might offer will be greatly appreciated. (Detroit City Gas Co., Detroit, Mich.)

The fact that the inhalation treatment

must not be permitted to be the main support in electric shock has been discussed. The same thing is true of drowning. I have reports of cases of both these conditions which seem to show that the oxygen-carbon dioxide mixture has worked well. Neither furnishes a setting which makes the treatment imperative and the same thing is even more true in the case of infants in whom breathing does not occur. Inquiry into the methods of treating this last condition reveals the fact that some years ago when devices such as the pulmotor and lungmotor were new, obstetric hospitals either purchased them or tried them out. As time has passed, the efficiency of simpler measures has again prevailed and the best obstetric practice no longer employs either of these instruments, indeed fears them. I have obtained a report of twenty cases of infants treated with oxygen-carbon dioxide mixture. In sixteen of these the treatment was successful but the results are not significantly impressive, and at the moment it is not possible to contend that pulmotor, lungmotor, or inhaler offers assistance of more value than the simple measures which should be familiar to physicians.

It is always hard not to do something in an emergency, but it is as bad to do the wrong thing as it is to do nothing at all. In the case of non-breathing infants the best obstetric practice regards the pulmotor and lungmotor as potentially harmful and avoids their use. This being the case and any degree of proof that the oxygen-carbon dioxide inhalation is surely useful being lacking, it would appear best to recommend that calls to treat such infants be considered outside the province of rescue crew work. The fact that physicians still make these calls is a survival of ignorance, in the perpetuation of which it is unnecessary and wrong to co-operate.

Individuals, who for some reason cannot be placed in the prone position, should be treated by a combination of the Sylvester method of artificial respiration with the inhaler. At the present moment the author knows of no cases in which primary use of either pulmotor or lungmotor has been essential nor does there seem any reason to anticipate such instances. It is therefore recommended that in training rescue crews it be called to their attention that occasional emergencies may demand the Sylvester method and that instruction be given in it in order to meet rare situations.

A final matter on which information should be secured is the incidence of sequelae—pneumonia, etc.—following the inhalation treatment. At the present time we are unable to offer any facts in regard to this and when data are available they will not be comparable with figures on any other single type of treatment.

SUMMARY

1. The treatment of carbon monoxide poisoning by inhalation of a mixture of 5 per cent. of carbon dioxide and 95 per cent. of oxygen has been in use for two years.

2. At the present time 300 organizations possess approved apparatus for giving this treatment. One hundred and eighty of these have replied to a letter of inquiry, 110 cases being reported in enough detail to be considered in this report, though the replies indicate a much larger actual use.

3. All the evidence obtained indicates: *(a)* The inhalation treatment is exceedingly valuable in mild gassing, relieving or preventing the occurrence of headache, nausea, etc. *(b)* Serious cases, still breathing, revive rapidly and thoroughly. *(c)* It is practicable to use the inhalation treatment with prone pressure artificial respiration when breathing has ceased.

While the foregoing report was being completed, the author corresponded with Dr. R. R. Sayers, Chief Surgeon of the United States Bureau of Mines and former member of the Resuscitation Commission, in order to obtain his opinion upon the general question of oxygen-

carbon dioxide inhalation. As a final result of an exchange of letters, Dr. Sayers has authorized the publication of the following statement covering his views upon the subject. Reference to Dr. Nicloux' published work is given in the bibliography.

"In our experimental work on men and on animals we found that breathing oxygen removed carbon monoxide from the blood about four times faster than did breathing air and that the carbon dioxide-oxygen mixture removed it about five times faster than did air. However, our experience with both men and animals indicates that the carbon dioxide-oxygen mixture gives no better results than does pure oxygen when judged by the time necessary for recovery after a given exposure to carbon monoxide and a given blood saturation and the condition of the animal or victim after treatment is about the same. The use of oxygen is far more practicable in the mining industry than is the carbon dioxide-oxygen mixture. Dr. Nicloux, Professor of Biological Chemistry, University of Strasbourg, France, and Commander Walton, of the U. S. Navy, assigned to Edgewood Arsenal, have confirmed these results. Dr. Walton's findings have not been published to my knowledge."

TABLE 1.—SUMMARY OF ADDITIONAL CASES OF MILD GASSING TREATED BY OXYGEN-CARBON DIOXIDE INHALATION

Name of Company	*Age of Patient*	*Source of Poison*	*Time of Exposure*	*Time Before Inhalation*	*Condition Before Inhalation*	*Pulse*	*Breathing*	*Time of Inhalation*	*Condition After Inhalation*	*Condition Next Day*
			hr.-min.	*hr.-min.*				*hr.-min.*		
St. Paul Gas Light Co.	27	gas main	0–15	0–10	severe headache	....	normal	0–20	no headache	good
	38	leaking gas main	....	0–10	headache	....	normal	0–10	no headache	no effect
	26	leaking gas main	1–15	1–0	severe headache	....	....	0–7	good; dull feeling	very good
		leaking gas main	1–30	2–0	headache	....	....	0–15	almost normal	.....
	28	broken gas main	2–0	0–25	severe headache	....	....	0–15	normal	very good
Chicago By-Product Co.	48	gas plant	0–45	0–20	weak	slow	weak	0–15	fair; pulse stronger, breathing good	little headache
	..	gas plant	0–5	0–15	hazy headache	....	....	....	headache much improved	little headache .....
	41	gas plant	0–10	0–15	headache	....	....	....	no headache	good results
	Six men working in gas plant.			....	.....	....	....	....		good results
The Peoples Gas Light & Coke Co.	42	leaking pipe	....	short time	dazed	weak and thready	shallow	0–15 to 20	breathing and pulse improved	good
Wierton Steel Co.	22	leaking pipe	0–2	0–10	conscious	118	12	0–25	good; pulse 103, breathing 20	.....
Boston Consolidated Gas Co.	5	open gas tube	....	0–35	conscious; poor	40	6	0–25	very good	.....
	50	pilot light out	....	0–25	conscious; poor	fast	10	0–15	fair	good
	1½	open gas jet	0–35	0–35	conscious; poor	40	10	0–20	very good	.....
	22	auto fumes	0–20	0–45	conscious; poor	40	8	0–45	much improved	good
	23	auto fumes	0–20	0–45	poor	40	10	0–45	much improved	good
	60	gas tube	0–30	0–10	fair; dizzy	80	12	0–15	normal	good

TABLE 2.—SUMMARY OF ADDITIONAL CASES OF SERIOUS GASSING TREATED BY OXYGEN-CARBON DIOXIDE INHALATION

Name of Company	Age of Patient	Source of Poison	Time of Exposure	Time Before Inhalation	Condition Before Inhalation	Pulse	Breathing	Time of Inhalation	Condition After Inhalation	Condition Next Day
			hr.-min.	hr.-min.				hr.-min.		
The Peoples Gas Light & Coke Co.	55	open gas jets	.....	....	unconscious; gasping	..	...	0–15	breathing deeply; dazed	.....
Fall River Police Dept.	86	open gas cock	...	...	unconscious; breathing slight	..	...	2–0	unconscious; breathing naturally	dead 9 hrs. after found
Coney Island, N. Y.	50	....	...	...	asphyxiated; breathing slightly	..	...	0–5	revived; breathing more normal	.....
Rochester Gas & Electric Corp.	55	....	...	1–0	poor; pulse high breathing shallow	..	...	0–30	good	.....
Central Hudson Gas & Electric Co.	45	hot water heater	1–0	1–15	semiconscious	..	shallow	0–15	breathing practically normal; bad headache	good
New Haven Hospital	52	open gas jet	...	0–30	coma; very weak	90	8	0–45	responded to questions; pulse 120, breathing 24	.....
John Tabaka	35	coal stove gas	...	1–0	unconscious	40	3–8	0–30	semiconscious; pulse 80, breathing 20	.....
Boston Consolidated Gas Co.	40	....	...	1–0	poor	40	poor	0–25	improved	recovered
Redfield Fire Dept.	..	coal gas	long time	...	cyanosed	..	3–4 shallow	0–20	conscious	recovered
Wisconsin Public Service Corp.		gas main	0–10	0–15	unconscious	..	slight	0–15	good	recovered
Kings County Lighting Co.	30	suicide	0–25	0–8	unconscious	none	slow	0–20	conscious	well
San Diego Gas & Electric Co.		gas main	0–10	short time	unconscious	weak	jerky for 3 periods	0–10	conscious	O. K.
Long Beach Fire Dept.	13	gas fumes	...	...	unconscious	..	faint	0–41	good	O. K.
	55	suicide	...	...	unconscious	..	..	0–28	fairly good	.....
	32	gas fumes	...	...	nearly unconscious	feeble	slow, shallow	0–24	conscious	O. K.
Public Service of Colo.		gas main	...	...	unconscious	..	slight	1–0	conscious	well
Fall River Gas Works	70	open jets	...	...	unconscious	weak	shallow	0–18	conscious	very well

TABLE 3.—SUMMARY OF ADDITIONAL CASES OF GASSING IN WHICH BREATHING WAS ABSENT AND WHICH WERE TREATED WITH PRONE PRESSURE ARTIFICIAL RESPIRATION AND INHALATION

Name of Company	Age of Patient	Source of Poison	Time of Exposure	Time Before Inhalation	Condition Before Inhalation	Pulse	Breathing	Time of Inhalation	Condition After Inhalation	Condition Next Day
			hr.-min.	hr.-min.				hr.-min.		
Commonwealth Edison Co.	47	suicide	2 to 3–0	0–40	unconscious	..	none	2–35	pulse 120, breathing 24	.....
Coney Island, N. Y.	58	open gas jets	...	...	unconscious	..	none	0–25	breathing revived	.....
Reed Cranmer, M.D.	2 adults	....	...	...	unconscious	..	none	3–0	revived	recovered
Ft. Dodge Gas Co.	23	gas in ditch	0–20	0–30	very bad, weak	..	none	0–30	good; normal breathing	O. K.
Long Beach Fire Dept.	50	....	...	...	apparently dead	none	none	1–51	revived; color good	.....
Kings County Lighting Co.	65	open gas jets	0–20	0–6	apparently dead	none	none	0–23	slight pulsation	O. K. after 3 days
	23	coal gas	2–0	0–9	apparently dead	none	none	0–23	conscious	good
	65	suicide	1–0	0–8	apparently dead	..	none	0–14	conscious	good
New Bedford Police Dept.	50	illuminating gas	...	...	unconscious	none	none	0–25	conscious	O. K.
	70	gas fumes	...	...	unconscious	..	..	0–20	conscious	O. K.

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2. Rossiter, F. S.: Carbon Monoxide Gas Poisoning. Carnegie Steel Company, Rankin, Pa., 1922, pp. 16.
3. Nicloux, M., Nerson, H., Stahl, J., and Weill, J.: Sur l'élimination de l'oxyde de carbone après intoxication grave: Influence de la respiration de l'air ou de l'oxygéne additionnès de 5 p. 100 d'acide carbonique. Compt. rend. Soc. de biol., 1925, 92, 178.

Addenda from Dr. Haldane

DURING the preparation of the above article, the following letter was received from Dr. J. S. Haldane, an internationally recognized authority on resuscitation.

Cherwell, Oxford, November 30, 1925.

My dear Professor Drinker,

In view of doubts which have been expressed as to the advantages, in the first-aid treatment of carbon monoxide poisoning, of adding about 5% of carbon dioxide to the oxygen used, as recommended by Yandell Henderson and Haggard, you have asked me to express an opinion on the subject.

I wish to say at once that I am strongly in favour of the carbon dioxide admixture. Not only does the carbon dioxide, by increasing greatly the depth of breathing, hasten in corresponding degree the elimination of carbon monoxide from the blood, but the carbon dioxide itself gives marked immediate relief to the anoxaemia. It does so by enabling the circulation, kept in check by the alkalosis produced by increased breathing of CO poisoning, to increase at once, thus carrying much more oxygen to the tissues. In a recent paper* I described a series of experiments on animals where this relief was strikingly demonstrated, and I showed that in cases where, as at underground fires in mines, it is difficult to provide sufficient quantities of the oxygen-carbon-dioxide mixture, a mixture of carbon dioxide and air may be used with great advantage, since a small cylinder of liquid carbon dioxide will provide a very large quantity of the mixture. The mixture of carbon dioxide and air is, I think, superior to pure oxygen, though inferior to the mixture of oxygen and carbon dioxide.

I remember well how disappointed I was, about thirty years ago, when I tried on myself the effects of pure oxygen when I was on the point of losing consciousness during experimental carbon monoxide poisoning.† At that time I had, of course, no conception of the importance, or even the existence, of the alkalosis of carbon monoxide poisoning. The experiments of Henderson and Haggard brought this factor to light, and at once the whole subject was illuminated. Their inferences fitted in with a number of other facts relating to alkalosis in anoxaemia and to the regulation of the circulation.

I feel no doubt that further experience will fully confirm the advantages of adding carbon dioxide in the non-toxic proportion of about five per cent to the oxygen or air used in first-aid to cases of carbon monoxide poisoning or temporary anoxaemia produced by methane or other physiologically indifferent gases.

Yours very sincerely,

(Signed) J. S. HALDANE.

*Trans. of the Institution of Mining Engineers, LXVIII, p. 271, 1924.
† Journ. of Physiol., XVIII, p. 458, 1895.

Associations Affiliated with A. G. A.

Canadian Gas Association
Date of Affiliation—Mar. 25, 1919.
Pres.—J. J. Humphreys, Montreal Light, Heat & Power Co., Montreal, Que.
Sec.-Tr.—G. W. Allen, 7 Astley Avenue, Toronto.
Conv., Montreal, Que., July 8 and 9, 1926.

Empire State Gas and Electric Association
Date of Affiliation—Nov. 21, 1919.
Pres.—E. C. Scobell, Rochester Gas & Electric Corp., Rochester, N. Y.
Chairman Gas Section—C. C. Atwood, The Brooklyn Union Gas Co., Brooklyn, N. Y.
Sec.—C. H. B. Chapin, Grand Central Terminal, New York, N. Y.
Annual Meeting, 1926.

Illinois Gas Association
Date of Affiliation—Mar. 19, 1919.
Pres.—R. E. Chew, Union Gas & Electric Co., Bloomington, Ill.
Sec.-Tr.—R. V. Prather, 305 Illinois Mine Workers Bldg., Springfield, Ill.
Conv., Chicago, Ill., 1926.

Indiana Gas Association
Date of Affiliation—April 24, 1919.
Pres.—H. J. Roach, Northern Indiana Gas and Electric Co., Crawfordsville, Ind.
Sec.-Tr.—E. J. Burke, Room 1314, Peoples Gas Bldg., Chicago, Ill.
Conv., 1926.

Iowa District Gas Association
Date of Affiliation—May 21, 1919.
Pres.—C. M. Benedict, Des Moines Gas Co., Des Moines, Iowa.
Sec.-Tr.—H. R. Sterrett, 551 Seventh St., Des Moines, Ia.
Conv., 1926.

Michigan Gas Association
Date of Affiliation—Sept. 18, 1919.
Pres.—B. G. Campbell, Consumers Power Co., Pontiac, Mich.
Sec.-Tr.—A. G. Schroeder, Grand Rapids Gas Light Co., Grand Rapids, Mich.
Conv., Mackinac Island, Mich., June 24, 25, 26, 1926.

Missouri Association of Public Utilities
Pres.—Wiley F. Corl, Community Power & Light Co., St. Louis, Mo.
Sec.-Tr.—F. D. Beardslee, 315 N. 12th St., St. Louis, Mo.
Conv., 1926.

New England Association of Gas Engineers
Date of Affiliation—Feb. 19, 1919.
Pres.—H. N. Cheney, Boston Consolidated Gas Co., Boston, Mass.
Sec.-Tr.—J. L. Tudbury, 247 Essex St., Salem, Mass.
Conv., Boston, Mass., Feb. 24 and 25, 1926.

Gas Sales Association of New England
Date of Affiliation—Oct. 1, 1919.
Gov.—J. J. Quinn, Citizens Gas Light Co., Quincy, Mass.
Sec.—J. H. Sumner, 719 Massachusetts Ave., Cambridge, Mass.
Monthly Meetings.

New Jersey Gas Association
Date of Affiliation—April 25, 1919.
Pres.—H. D. Whitcomb, Public Service Electric & Gas Co., Newark, N. J.
Sec.-Tr.—R. A. Koehler, Public Service Electric & Gas Co., Newark, N. J.
Conv., 1926.

Oklahoma Utilities Association
Date of Affiliation—June 16, 1926.
Pres.—R. C. Sharp, Oklahoma Natural Gas Co., Tulsa, Okla.
Mgr.—E. F. McKay, Oklahoma City, Okla.
Conv.

Pacific Coast Gas Association
Date of Affiliation—Sept. 18, 1919.
Pres.—F. J. Schafer, Southern California Gas Co., Los Angeles, Calif.
Exec. Sec.—Clifford Johnstone, 447 Sutter St., San Francisco, Calif.
Conv., Los Angeles, Calif., 1926.

Pennsylvania Gas Association
Date of Affiliation—April 10, 1919.
Pres.—Wallace G. Murfit, Bucks County Public Service Co., Newtown, Pa.
Sec.-Tr.—Geo. L. Cullen, Harrisburg Gas Co., Harrisburg, Pa.
Mid-Year Meeting, Scranton, Pa., Dec. 7, 1925.

Southern Gas Association
Date of Affiliation—May 20, 1919.
Pres.—S. E. Linton, Nashville Gas & Heating Co., Nashville, Tenn.
Sec.-Tr.—J. P. Connolly, 141 Meeting St., Charleston, S. C.
Conv., New Orleans, La., March 15, 16, 17, 1926.

Southwestern Public Service Association
Date of Affiliation—September 26, 1923.
Pres.—Paul E. Nicholls, Galveston Gas Company, Galveston, Texas.
Chairman Gas Section—H. E. Danner, Houston Gas & Fuel Company, Houston, Texas.
Sec.—E. N. Willis, 403 Slaughter Bldg., Dallas, Texas.
Conv., 1926.

Wisconsin Utilities Association
Date of Affiliation—March 25, 1919.
Pres.—G. H. Wilmarth, Northern States Power Co., Eau Claire, Wis.
Chairman Gas Section—S. B. Sherman, Wisconsin Gas & Electric Co., Racine, Wis.
Exec.-Sec.—J. N. Cadby, 445 Washington Bldg., Madison, Wis.
Conv., 1926.

Geographic Divisions

Eastern States Gas Conference
Date of Formation—April 11, 1923.
Pres.—W. Griffin Gribbel, John J. Griffin & Co., Philadelphia, Pa.
Sec.-Tr.—R. A. Koehler, Public Service Electric & Gas Co., Newark, N. J.
Conv., 1926.

Employment Bureau

SERVICES REQUIRED

GAS COMPANY operating in the Metropolitan District, New York, offers a permanent position to a thoroughly qualified Street Main Foreman. Address giving experience, salary expected and when services are available. Answers will be considered confidential if desired. Address A.G.A.
Key No. 058.

DESIGNER—Well known manufacturer of high grade gas burning appliances has a position open for a competent man for experimental work and design of gas stoves, radiant heaters, tank water heaters, etc. Must be a practical man experienced with gases of various kinds and qualities. State fully your training, experience and salary expected. Address A. G. A.
Key No. 062.

ENGINEER—A large Eastern engineering and contracting organization, specializing in public utility work, desires the services of an energetic engineer of good personality with technical education and experience in construction operation and design of coal and water gas plants, to handle engineering and preparation of plans and specifications for new gas works and works improvements, also to handle such questions with customers on contracts entered into. Address A. G. A.
Key No. 069.

OPENING for Gas Works Chemist with large company in Southern California. Must be experienced, well qualified technical man. Some oil experience desirable. Address A. G. A.
Key No. 070.

LARGE COMPANY operating in Middle West desires to employ two Industrial Gas Engineers for Industrial Gas Sales and Survey Work. Will be employed on straight salary. State age, salary expected and past experience. Address A. G. A.
Key No. 071.

ENGINEER—Large operating company desires the services of an engineer with experience in the application of gas and the selling of industrial gas appliances. State age, past experience and salary expected. Address A. G. A.
Key No. 072.

SERVICES OFFERED

WANTED: Position by a Gas Engineer with twenty-three years' experience in all branches of the gas business and who has had experience in plant efficiencies and gas distribution problems. His connection with a strong operating company would make him a valuable man for a holding or a large operating company owing to his ability to reduce manufacturing and distribution costs. Would prefer position in the East. Address A. G. A.
Key No. 193.

PUBLIC UTILITY EXECUTIVE, with broad experience in engineering, management and finance desires position. Offers character, integrity and ability with service. Address A. G. A.
Key No. 196.

WANTED—Position as Manager or Engineer for a gas or gas and electric property by practical Gas Engineer thoroughly conversant with management problems, rates, industrial business development, design, construction and operation of coal and water gas plants, high and low pressure transmission and distribution. Considerable experience with electric power plants and natural gas properties. Technical education and twenty-two years' experience, fourteen years of which have been in gas and public utility work. Address A. G. A.
Key No. 197.

OPERATING ENGINEER desires communication with a utility property requiring the services of an operating engineer. Property either electric or gas or combined preferably in a medium size city with 25,000 customers or upward. Location preferably north central State or Canada. Position general superintendent or manager. Have had twenty-one years active contact with operating problems of diversified nature in electric, gas, water and telephone utility service as cadet engineer, superintendent of distribution, chief engineer, general superintendent and manager. Am at present employed. Address A. G. A.
Key No. 198.

WANTED: Position as manager or superintendent of a coal, water or combination gas plant, by a technical man, thirty-five years of age, with thirteen years' all around gas experience. Services available upon reasonable notice to present employer. Address A. G. A.
Key No. 199.

POSITION—Sales Manager of new business on Domestic, Hotel and Industrial appliances, desires similar position with promising future. Fourteen years' experience from shop through all commercial departments of one of the largest Utility Companies on the East. Thirty-six years old. Single. Services available in two weeks. Address A. G. A.
Key No. 201.

TECHNICAL MAN—(34) desires position as manager or superintendent of gas plant in city of 20,000 to 50,000 population; have had twelve years' experience in gas business of which last six have been as manager of gas properties; experience as superintendent of high and low pressure distribution; business and technical education; married; available immediately; references from present and former employers; prefer South. Address A. G. A.
Key No. 202.

POSITION WANTED—High grade specialty salesman, specializing in sales of gas-fired boilers and automatic water heaters for past 15 years; will be open for sales position with manufacturer or gas company October 1, 1925; thoroughly conversant with all phases of water heating and house heating; best of references from past and present employers together with details of ability will be submitted; road experience, no objection to travel. Address A. G. A.
Key No. 203.

WANTED—Position as manager of relatively small gas company or as engineer of larger property. Coal or water gas. Young, technically trained engineer (chemical and mechanical) with 10 years' unusually broad experience in all phases of industry, including manufacture, commercial and industrial, wishes to locate with property in need of man who can show the kind of results that mean increased net earnings. Address A. G.A.
Key No. 204.

WANTED—Am open for position as appliance salesman with appliance manufacturer, experience covers over fifteen years in the sale of gas ranges, automatic water heater and heating appliances, or as manager of appliance sales department with a gas operating company, experience includes executive and technical training. Married. A1 references. Address A. G. A.
Key No. 205.

A COLLEGE GRADUATE, twenty-six years old, unmarried, three years' experience in operating plant with maximum daily send-out of 2600 M; fifteen months in charge of smaller plant and distribution, would like position with advancement. Address A. G. A.
Key No. 206.

AN ENGINEER experienced in the development of large volume commercial and industrial gas business is open for position as Utility Manager or department head. Record and references on file with A. G. A. Address A. G. A.
Key No. 207.

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